



Bi+CAS 2017

THE EDGE OF TOMORROW IN mHEALTH

TURIN



2017 CONFERENCE PROGRAM

biocas2017.org

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WELCOME MESSAGE FROM THE GENERAL CHAIR

Dear Friends and Colleagues,

On behalf of the Organizing Committee I am honoured to welcome you to BioCAS 2017 Conference at Politecnico di Torino, one of the top engineering schools in Italy with the oldest tradition in technology education and research.

During BioCAS17 we will share our experiences in Mobile Health Technologies, bringing the novel advances in the application of Circuits and Systems to the innovation of Biomedical Devices. Mobility has a key role in actual biomedical applications and in BioCAS17 its impact in the design of innovative systems applied to healthcare and life sciences will be analysed and highlighted. BioCAS17 will touch other important topics too, including devices for precision medicine, rehabilitation systems and human brain interfaces, continuing the tradition started last year in Shanghai with BrainCAS, with two dedicated Special Sessions.

Within BioCAS17 it will have its first edition a new workshop, named FoodCAS, that seeks to be a reference meeting of scientists and industry stakeholders engaged in developing the edge technologies for food production, preparation, monitoring and preservation.

In line with the past BioCAS Conferences and with the IEEE guidelines, we have not printed a conference program, in order to be “more green” and gentle with our lovely environment. Continuing the conference tradition to develop the scientific program in a single-track-mode, you can have a look day-by-day at the printed program present in front of the Session Room, as well as download our Final Program at the link: <http://biocas2017.org/program-schedule>.

Similarly, we also have not printed the book of the abstracts. However, you can have full access to all the abstracts, as well as to all the papers, by downloading the Conference Proceedings at the link provided to you in your welcome email. You may download the Conference Proceedings only during the week of the conference (Thursday, October 19 - Saturday, October 21). The password to download is BIOCAS2017

Please access the Whova App, which will be the social tool for the Conference attendees.

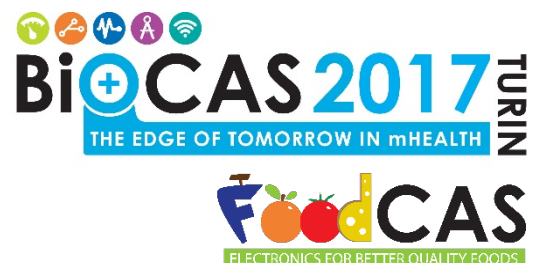
On behalf of all the members of our outstanding Organizing Committee, I cordially invite you to follow and contribute to the scientific program and make possible the full success of our conference!

We are all very proud and happy to have you all in Torino!

Sincerely yours,



General Chair,
Danilo Demarchi
BioCAS 2017



WELCOME MESSAGE FROM THE TECHNICAL PROGRAM COMMITTEE

Dear members of the BioCAS community,

We are delighted to join General Chair Danilo Demarchi in welcoming you to what promises to be a most exciting BioCAS 2017 conference! We received a total of 306 paper submissions, up 9% from previous year. We are pleased to observe that this still increasing of the paper submissions, sign of a broadened participation by members of the BioCAS community, underscoring the important role of the synergy between technology advances in circuits and systems, and applications to biomedicine and clinical practice capable of impacting health and wellness globally.

The technical program that you are about to enjoy is the result of dedicated work by a increasing number of volunteers, in addition to the contributing authors. A total of 54, 29% more than in 2014, Review Committee Members (RCMs), listed below, coordinated the peer review of all submitted papers by recruiting a total of 1343 Reviewers assigned covering expertise across all areas of BioCAS. A total of 1152 reviews were received, an average of over four reviews per paper. A total of 207 paper submissions were accepted into the BioCAS 2017 program, which represent an acceptance rate of 68 percent. Accepted papers were grouped in nine Lecture Sessions totaling 57 papers, and eight Poster Sessions for a total of 150 papers. Decisions on acceptance were made based on RCM recommendations, and a weighted score of reviewer recommendations according to criteria of overall quality, originality, relevance, and clarity. Decisions on presentation type (lecture or poster) were made using the same criteria, in addition to presentation preference by the authors.

BioCAS 2017 definitely continues the tradition of BioCAS as a single-track conference, offering a range of exciting ways for authors to present their work to the entire attendance. In addition to conventional poster and lecture presentations, these include poster spotlights in the oral program, and live interactive demonstrations.

We look forward to seeing you in Turin and to your active participation in all aspects of the conference!

Sandro Carrara, Pedram Mohseni, Fernando Corinto
Technical Program Chairs

PROGRAM AT A GLANCE

PROGRAM SCHEDULE - Thursday, October 19, 2017	
7:00-18:00	REGISTRATION - Foyer
8:00-8:30	OPENING CEREMONY – Aula Magna
8:30-10:00	<i>Tutorial: Bio electrochemical sensors: an overview and forecast</i> Yosi Shacham Tel Aviv University Room: Aula Magna
10:00-11:00	<i>Coffee Break & Poster Session: Biosensor Devices and Interfaces</i> Room: Sala Consiglio di Facoltà
11:00 – 12:30	<i>Tutorial: Integrated Microsystems for Medical Ultrasound Imaging</i> F. Levent Degertekin Georgia Institute of Technology Room: Aula Magna
12:30 – 13:30	LUNCH - Sala Consiglio di Facoltà
13:30 – 14:30	<i>Keynote 1: mHealth Technology for the Clinical Management of Chronic Conditions</i> Paolo Bonato Harvard Medical School & Spaulding Hospital, Boston, USA Room: Aula Magna
14:30 – 16:00	<i>Tutorial: Implantable electronics for highly parallel neural interfaces</i> Mauritz Ortmanns University of Ulm Room: Aula Magna
16:00 – 17:00	<i>Coffee Break & Poster Session: Smart Data Acquisition and Processing</i> Room: Sala Consiglio di Facoltà
17:00 – 18:30	<i>Tutorial: Development of implantable electronics: issues and trends</i> Maaïke Op de Beeck Imec Room: Aula Magna
18:30 – 19:00	<i>Training and Innovation: How to Re-design effectively our future together</i> Room: Aula Magna
19:00 – 22:00	WELCOME RECEPTION - Sala Consiglio di Facoltà Live Interactive Demonstrations

PROGRAM SCHEDULE - Friday, October 20, 2017	
7:30-18:00	REGISTRATION - Foyer
8:00-9:30	Lecture Session - Aula Magna Biomedical Imaging
9:30 – 10:30	<i>Coffee Break & Poster Session: Wireless & Wearable Technology</i> Room: Sala Consiglio di Facoltà
10:30-12:00	Lecture Session – Aula Magna Biosensor Devices
12:00-13:00	LUNCH - Sala Consiglio di Facoltà
13:00 – 14:00	<i>Keynote 2: The future of health through a technology lens. Is precision medicine the answer?</i> Gianluca Pettiti Thermo Fisher Scientific China, Shanghai, China Room: Aula Magna
14:00-15:30	Lecture Session – Aula Magna Biosignal Recording
15:30-16:30	<i>Coffee Break & Poster Session: Biosignal Recording & Processing</i> Room: Sala Consiglio di Facoltà
16:30 – 18:00	Lecture Session - Aula Magna Bio-inspired Circuits
18:45 – 24:00	Gala Dinner – La Venaria Reale

PROGRAM SCHEDULE – Friday, October 20, 2017 - FoodCAS Workshop	
<i>Department of Electronics and Telecommunications Corso Castelfidardo 42/A, 5th Floor Meeting Room</i>	
8:30	Registration
8:45 – 9:00	Opening
9:00 – 9:45	<i>Keynote 1: IEEE SmartAg: Technology applied to the food supply chain</i> John P. Verboncoeur <i>Michigan State University, USA</i>
9:45 – 11:00	Lecture Session – Foods-I
11:00 – 11:15	BREAK
11:15 – 12:30	Lecture Session – Foods II
12:30-14:00	LUNCH - Sala Consiglio di Facoltà
14:00 – 14:45	<i>Keynote 2: - The use of advanced spectroscopic methods for food process monitoring and control</i> Søren Balling Englesen <i>University of Copenhagen, Denmark</i>
14:45 – 16:15	Lecture Session – Milk, Drink, Meat and Plants
16:15 – 16:45	BREAK
16:45	Discussion Panel <i>Does agriculture (plants, foods, etc...) need more high-tech interventions? Which ones?</i>
18:45 – 24:00	Gala Dinner – La Venaria Reale

PROGRAM SCHEDULE - Saturday, October 21, 2017	
7:30 – 18:00	REGISTRATION - Foyer
8:30-10:00	Lecture Session - Aula Magna Special Session: BrainCAS, Next Generation Neural Implants
10:00-11:00	<i>Coffee Break & Poster Session: Special Session: BrainCAS, Neural Implants + Implantable Electronics & Interfaces</i> Room: Sala Consiglio di Facoltà
11:00 – 12:00	<i>Keynote 3: Smart circuit design for a smart world</i> Georges Gielen <i>Department of Electrical Engineering, KU Leuven, Belgium</i> Room: Aula Magna
12:00-12:45	LUNCH - Sala Consiglio di Facoltà
12:45 – 14:15	Lecture Session - Aula Magna Implantable Electronics
14:15 – 15:45	Lecture Session – Aula Magna Special Session: Body Dust
15:45 – 16:30	<i>Coffee Break & Poster Session: Smart Devices, Circuits, and Systems</i> Room: Sala Consiglio di Facoltà
16:30 – 18:00	Lecture Session – Aula Magna Biosensor Interfaces
18:00 – 19:00	Walk under the Arcades – Guided Tour
19:00 – 21:00	FAREWELL EVENT – Palazzo Madama

GENERAL INFORMATION

Registration & Information Desk

The Registration and Information Desk will be open during the following times:

Thursday, October 19	7:00 – 18:00
Friday, October 20	7:30 – 18:00
Saturday, October 21	7:30 – 18:00

Meeting Room Locations

Sessions: Aula Magna

Lunches: Sala Consiglio di Facoltà

Keynotes: Aula Magna

FoodCAS Workshop: Corso Castelfidardo 42/A, 5th Floor Meeting Room

Poster Sessions & Coffee Breaks: Sala Consiglio di Facoltà

Welcome Reception: Sala Consiglio di Facoltà

Live Demos: During the Welcome Reception in Sala Consiglio di Facoltà

Name Badges

All attendees must wear their name badges at all times to gain admission to all Conference events.

Electronic Proceedings

The Electronic Proceedings will be provided to you via Dropbox with login and password.

Conference Attire

Attire during the duration of the Conference is business casual.

Cellular Phones

As a courtesy to your fellow attendees, please turn off your cell phone ringer during the conference.

Conference App - Whova

A BioCAS 2017 conference app is available for download:

http://biocas2017.org/sites/biocas2017.org/files/documents/pdf/poster_whova.pdf

SOCIAL PROGRAM

Thursday, October 19

Event: Thursday Lunch

Time: 12:30 – 13:30

Location: Sala Consiglio di Facoltà

Your paid registration fee includes one Thursday lunch ticket. Guest tickets can be purchased for \$50.00 USD each at the Registration Desk.

Event: Welcome Reception

Time: 19:00 – 22:00

Location: Sala Consiglio di Facoltà

Join us for the Welcome Reception on Thursday, October 19 in the Sala Consiglio di Facoltà at Politecnico di Torino. Live Demonstrations will be presented. Cocktails and hors d'oeuvres will served. Your paid registration fee includes one Welcome Reception ticket. Guest tickets can be purchased for \$30.00 USD each at the Registration Desk, and include access to the Farewell Event as well.

Friday, October 20

Event: Friday Lunch

Time: 12:00 – 13:00

Location: Sala Consiglio di Facoltà

Your paid registration fee includes one Friday lunch ticket. Guest tickets can be purchased for \$50.00 USD each at the Registration Desk.

Event: Gala Dinner

Time: 18:45 – 24:00

Location: La Venaria Reale

Our Conference Banquet will be held at La Venaria Reale! Come and join us for an elegant dinner, beautiful music, and a celebration of the 13th BioCAS Conference! Transportation will be provided. The buses will pick attendees up in front of Politecnico starting at 18:45. Your paid registration fee includes one banquet ticket. Guest tickets can be purchased for \$100.00 USD each at the Registration Desk.

Saturday, October 21

Event: Saturday Lunch

Time: 12:00 – 12:45

Location: Sala Consiglio di Facoltà

Your paid registration fee includes one Saturday lunch ticket. Guest tickets can be purchased for \$50.00 USD each at the Registration Desk.

Event: Walk under the Arcades to the Farewell Event

DepartureTime: 18:00

Event: Farewell Event

Time: 19:00 – 21:00

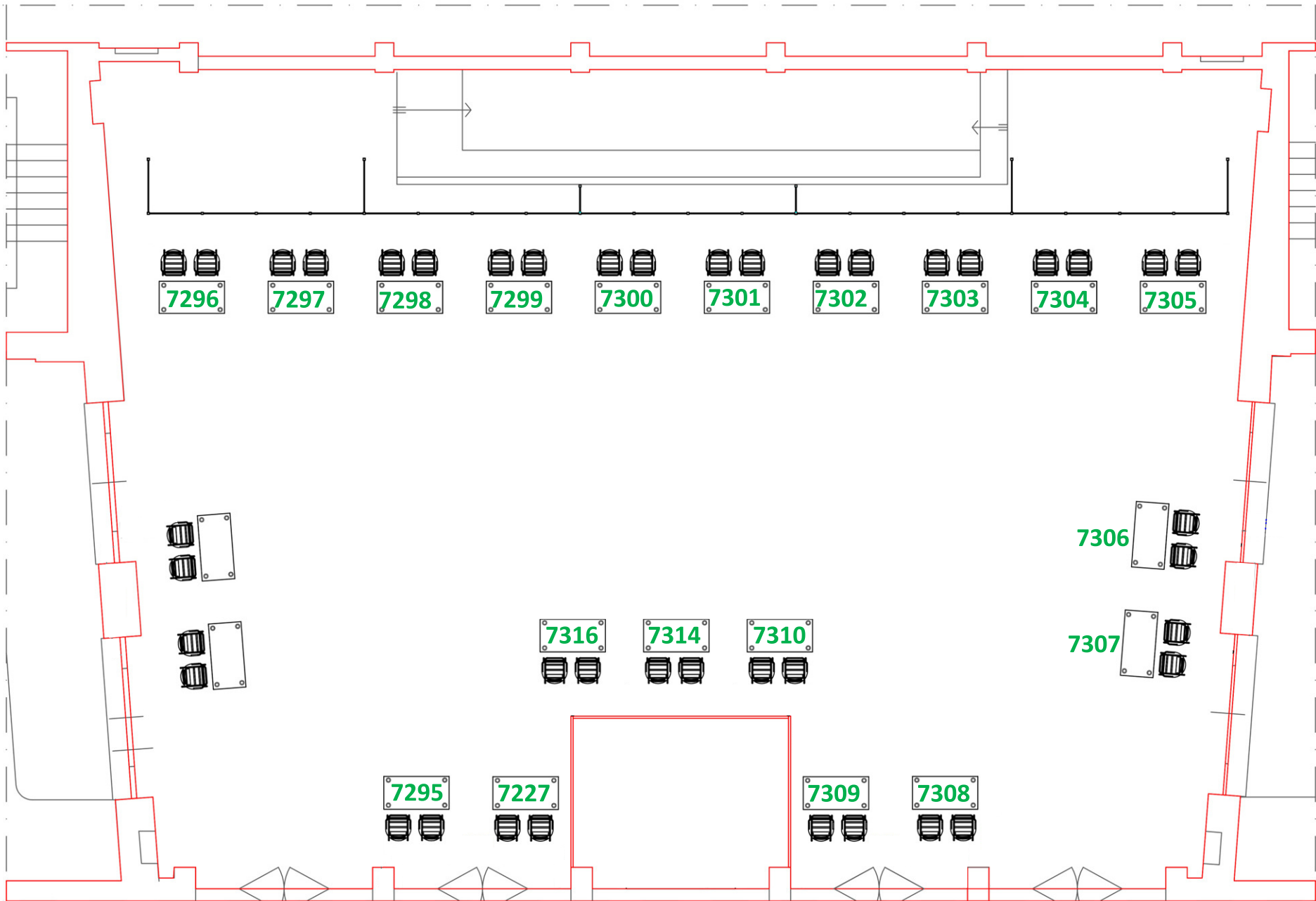
Location: Palazzo Madama

Join us for a reception at Palazzo Madama! Transportation: There will be an organized Walk under the Historical Torino Arcades. This will be about a 30 – 40 minute walk. Your paid registration fee includes one farewell event/museum tour ticket. Guest tickets can be purchased for \$30.00 USD each at the Registration Desk, and include access to the Welcome Reception as well.

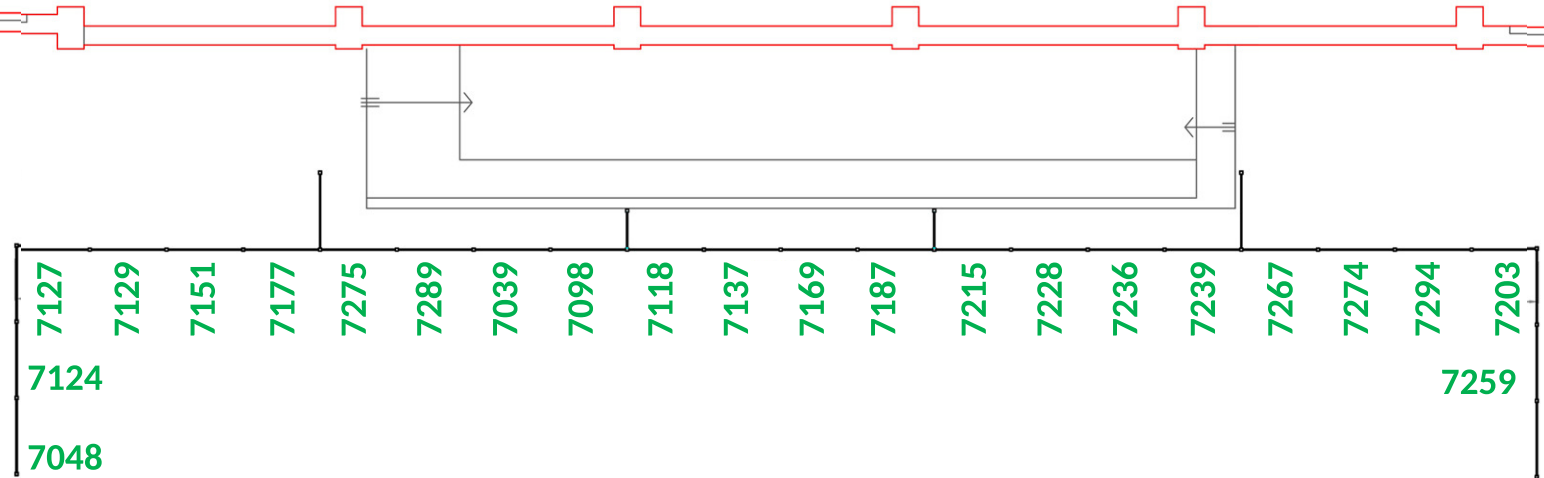
CONFERENCE VENUE MAP



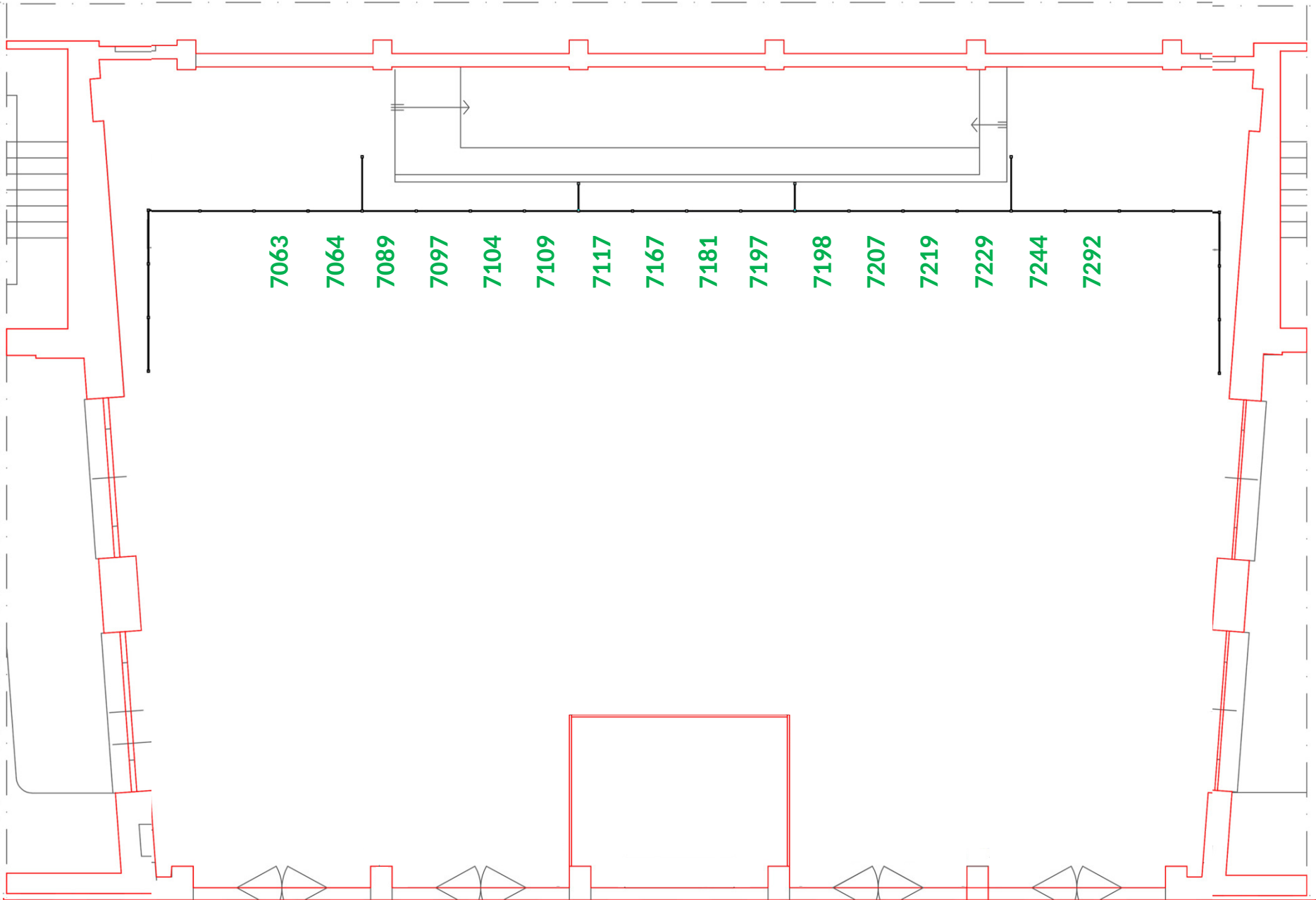
LIVE DEMOS: A4P-C (Thu. Oct. 19th 19:00-22:00)



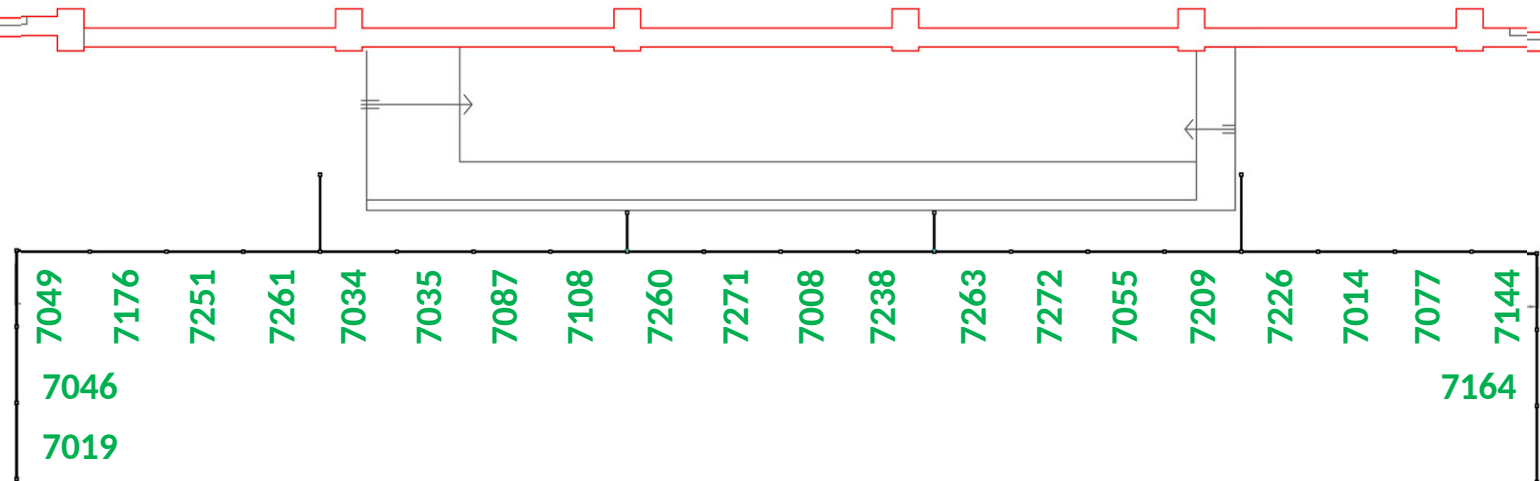
Posters: A1P-C (Thu. Oct. 19th 10:00-11:00)



Posters: A3P-C (Thu. Oct. 19th 16:00-17:00)

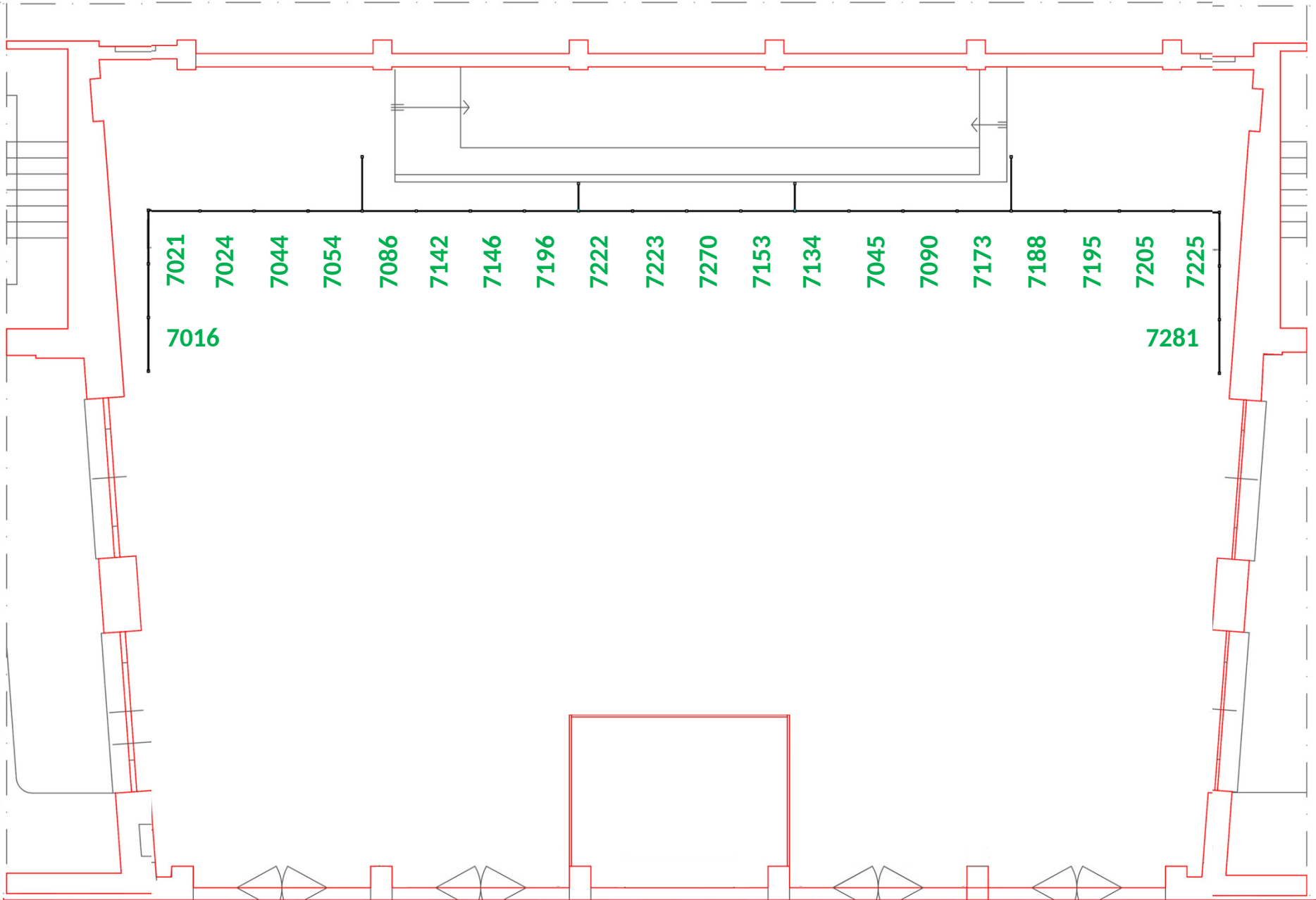


Posters: B3P-C (Fri. Oct. 20th 09:30-10:30)



The floor plan shows a large central hall with a red boundary. A long horizontal corridor runs across the middle, with room numbers labeled in green. The numbers are: 7051, 7059, 7067, 7072, 7082, 7092, 7105, 7106, 7115, 7119, 7136, 7175, 7184, 7231, 7234, 7268, 7269, 7277, 7282, and 7283. To the left of the corridor are the numbers 7036 and 7030. To the right is 7291. The plan also shows a staircase on the left, a large rectangular area at the bottom, and various structural elements like walls and doors.

Posters: C2P-C/D (Sat. Oct. 21st 10:00-11:00)



This floor plan shows a large hall with a central corridor and several rooms. The rooms are numbered as follows:

- 7158, 7186, 7210, 7010, 7050, 7041, 7116, 7066, 7080, 7100, 7138, 7199, 7233, 7290, 7031, 7052, 7083, 7096, 7130, 7143
- 7147, 7287 (on the left side)
- 7208, 7278 (on the right side)

The plan also includes a central corridor with a double-headed arrow indicating traffic flow, and a large rectangular area at the bottom center, possibly a stage or a large room.

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Exhibitors



KEYNOTE SPEAKERS

BioCAS

Thursday, October 19th – Prof. Paolo Bonato, *Harvard Medical School & Spaulding Hospital, Boston, USA*



" mHealth Technology for the Clinical Management of Chronic Conditions"

The concept of monitoring individuals in the home and community settings was first pursued more than 50 years ago, when Holter monitoring was proposed (in the late 1940s) and later adopted (in the 1960s) as a clinical tool. However, technologies to fully enable such vision were lacking since available systems to collect physiological data were rather obtrusive. Over the past fifteen years, we have witnessed a great deal of progress in the field of wearable sensors and systems that has significantly changed this situation. Advances in this field have finally provided the tools to implement and deploy technology with the capabilities required by clinicians to enable long-term monitoring of patients in the home and community settings. These technologies provide the

tools to achieve early diagnosis of diseases such as congestive heart failure, to facilitate the prevention of chronic conditions such as diabetes, to respond promptly to emergency situations such as a seizure in a patient with epilepsy, and to improve the clinical management of patients with chronic conditions. The current focus on developing and deploying wearable systems targeting specific clinical applications has potential for leading to adoption of mHealth technology in the clinic in the next five years or so. The potential role of mHealth technology in the clinical management of patients with late stage Parkinson's disease will be discussed as an example of how monitoring individuals outside of the clinic could provide clinicians with new tools to improve the management of patients with chronic conditions.

Friday, October 20th – Dr. Gianluca Pettiti, *Thermo Fisher Scientific China, Shanghai, China*



"The future of health through a technology lens. Is precision medicine the answer?"

Technological advancement, genomics, data, intelligence (Human and Artificial) are reshaping the way we prevent, diagnostic and treat disease. But where are we and where we need to go from a technological stand point to ensure we capture the full extent of technology and we create a healthier world? Is precision medicine the solution and if not how we can maximize and complement its contribution.



“Smart circuit design for a smart world”

The relentless progress of nanoelectronics and semiconductor technology fuel the technological revolution towards a smart world that immersively impacts our daily life, work and play. The Internet of Things, proactive healthcare monitoring, wellbeing comforting, cloud-based services, autonomous driving, industry 4.0, etc. are but a few examples. e-Health and personalized care are major opportunities for our aging populations. Sensors and sensor interfaces play a key role in all of these. After introducing the broader context, this keynote will focus on core challenges to the design of electronic circuits for these emerging applications. Cost, power and performance are main issues. Design techniques and circuit solutions will be presented with focus on high energy efficiency, low cost and high robustness. This will be illustrated with practical chip design examples for sensor-based and e-health applications.

John P. Verboncoeur , Michigan State University



“IEEE SmartAg: Technology applied to the food supply chain”

Among the many pressing challenges facing humanity, food safety and security are among the most fundamental. Cutting edge technologies, applied to the food supply chain from seed to table, can increase yields, reduce energy, fertilizer, and pesticide requirements, and provide real time monitoring of food quality and safety. Variants of these technologies already exist in our portfolio, and can be specialized to this important new application, while others are ripe for new development. The goal of the IEEE SmartAg initiative is to foster a community of technologists and subject matter specialists from across the food supply chain, and facilitate and sustain the convergence of these areas via conferences and publications.

Søren Balling Englesen, University of Copenhagen



“The use of advanced spectroscopic methods for food process monitoring and control”

The use of advanced spectroscopic sensors and multivariate data analysis are key technologies for the successful implementation of Process Analytical Technology (PAT) in the food industry. PAT represents a silent revolution in industrial quality control by introducing real-time process monitoring through fingerprinting of complex process streams using spectroscopic sensors and thereby moving from inferential monitoring and control towards 100% process control of core quality parameters. A new challenge related to the introduction of PAT will be to analyze the continuous stream of spectroscopic big data from multiple process points simultaneously. As chemometric methods are capable of simultaneously analyzing plentiful data origins from different sources (e.g., spectroscopy, temperature, and pressure), it will be natural to use them in a holistic data analysis strategy and monitor the manufacturing process by all available data. This means that data integration, data timing, and alignment will be key issues in future process control. Continuous learning through data collection and analysis over the life cycle of a product is important (FDA: PAT guidance, 2004).

The introduction of PAT can not only be used to minimize end-product variation and increase production capacity, but also to make optimal use of energy and raw materials. Examples of PAT implementation will be given in different areas of food production.

TUTORIAL SPEAKERS

October 19, 8:30 – 10:00 – Yosi Shacham



"Bio electrochemical sensors: an overview and forecast"

The term bio-electrochemical sensor is used for both electrochemical sensors for biological applications and for sensors that use biological systems; both concepts will be reviewed. In this tutorial, we will present an overview of electrochemical sensors medical and health care, food, agriculture and environmental applications. We will present a short overview of the first principles used for bio-electrochemical sensors such as the interactions that occur at the solid-electrolyte interface and transport phenomena in the electrolyte. We will present the state of the art methods and electrode technology and review the use of nano electrodes made of various materials: their highlights and problems. We will discuss the issues of specificity and selectivity and the use of surface functionalization to improve the electrode performance. Next, we will be preened the topic of electrochemical whole cell sensors, their modeling and few applications. A short overview of the important detection methods such as chronoamperometry, voltammetry and electrochemical impedance spectroscopy will be discussed. We will present the detection methods basic principles as well as the equipment setups for various applications. Finally, we will present a forecast of the application of bio-electrochemical sensors in light of the rapid developments in various fields such as information technologies and system miniaturization using micro and nanotechnologies.

October 19, 11:00 – 12:30 – F. Levent Degertekin



"Integrated Microsystems for Medical Ultrasound Imaging"

Ultrasound is the most frequently used medical imaging modality with applications from internal medicine, gynecology to cardiology and intravascular imaging. Most recent developments in this field focus on highly integrated systems for portable imaging probes wirelessly interfaced with cell phones and interventional catheter based devices with on-chip transmit-receive beamforming and multiplexing and take advantage of advances in real-time computing for fast imaging.

This tutorial will first present fundamentals of ultrasound imaging and generic imaging system components such as transducer arrays, analog front end electronics and image formation hardware. We will describe the cutting edge developments in piezoelectric and capacitive micromachined ultrasonic transducer (CMUT) technology, monolithic and multi-chip integration approaches that combine high density 2D transducer arrays for real-time 3D imaging and data processing. We will then focus on several microsystems for intravascular and intracardiac imaging where CMUT-on-CMOS technology is used to integrate low power analog front end and different time division multiplexing (TDM) schemes at the catheter tip. Specifically, we will describe a forward-looking volumetric intravascular ultrasound (IVUS) imaging system and an intracardiac imaging catheter with TDM and direct digital demultiplexing for cable reduction enabling interventions under MRI instead of X-ray guidance. Lastly, a system that can be integrated on a guidewire for IVUS imaging will be described as an ultimately miniaturized imaging system on a chip.

The tutorial will conclude with a discussion of recent work on integrated ultrasound systems from industry and leading academic labs, emerging techniques such as photoacoustic imaging, ultrasound imaging with molecular contrast and challenges ahead for this important imaging modality.

October 19, 14:30 – 16:00 – Maurits Ortmanns



"Implantable electronics for highly parallel neural interfaces"

Implantable medical devices (IMD) are nowadays widely employed to restore functions to the impaired individuals suffering from diseases like deafness, blindness, cardiac insufficiency, incontinence, neural disorders, and many more. Such implantable systems become increasingly challenging, if a large number of sensing or stimulating sites needs to be realized - space and power budget, safety issues, high bidirectional data rates, as well as the vast number of electrical interfaces make the electronic circuit design a complex task of research and development.

This talk will highlight some of the recent worldwide advances towards the realization of high channel count implantable neural interfaces, covering applications and system examples such as the retinal implant and neural modulators with high efficiency frontends, as well as give an overview of the supporting circuitry, such as transcutaneous data telemetry including safety and security aspects, power telemetry, and adaptive power management.

October 19, 17:00 – 18:30 – Maaïke Op de Beeck



"Development of implantable electronics: issues and trends"

Always more electronic devices are widely used in the medical world, from large computer-controlled diagnostic scanners over medium sized electronic equipment to small wearable devices. Due to the miniaturization of electronic chips and the development of MEMS, very small microsystems can be fabricated which offer a strong potential for usage inside the human body. Nevertheless, placing a device inside the human body is much more than making a small device: the interaction of implanted material with the body results in dedicated device requirements. The electronic device needs a dedicated encapsulation functioning as a very performant diffusion barrier, to avoid diffusion of toxic materials from the device

into the body, as well as to avoid leaching of body fluids inside the implant. Moreover, the encapsulation itself needs to be biocompatible and biostable, and ideally also soft and flexible to limit the natural 'foreign body reaction' of the human organism. Obviously the total device needs to be very reliable and safe, which will be controlled by regulatory authorities (FDA, EMEA,...) to ensure patient safety. While the medical world asks for always smarter implants with more functionality, typically resulting in a bigger device with a larger battery, there is also a strong demand for miniaturization of the implanted devices. To merge these two contradictive requests, smart engineering of implantable electronic devices is essential, combined with design for minimal power consumption, the use of alternative powering options, and the development of novel thin hermetic packaging technologies.

During the tutorial, the topics above will be discussed, to give the audience insight in the issues related with the development of electronic implants, and to indicate new development trends in order to create the electronic implants of the future.

BioCAS 2017 – THURSDAY, OCTOBER 19th

7:30 – 18:00
REGISTRATION
Room: Foyer

8:00 - 8:30
OPENING CEREMONY
Room: Aula Magna

8:30 - 10:00
TUTORIAL 1 – YOSI SHACHAM
Room: Aula Magna

10:00 – 11:00
COFFEE BREAK
Room: Sala Consiglio di Facoltà

10:00 – 11:00
POSTER SESSION: Biosensor Devices and Interfaces
Room: Sala Consiglio di Facoltà
Chairs: Maysam Ghovanloo and Jennifer Blain Christen

7048
Application of Magnetic Arrangement of Microbeads for CMOS Biosensor Array Sensitivity
Eizo Ushijima^{3}, *Satoshi Fujimoto*^{1}, *Kiichi Niitsu*^{4}, *Kazuo Nakazato*^{2}
^{1}MEMS CORE CO., Ltd, Japan; ^{2}Nagoya University, Japan; ^{3}Nagoya University / Aisin Cosmos R&D Co., Ltd., Japan; ^{4}Nagoya University / Japan Science And Technology Agency, Japan

7124
A Photochemical Dongle for Point-of-Care Evaluation of Blood Lipid Level
Xiwei Huang^{1}, *Jinhong Guo*^{2}
^{1}Hangzhou Dianzi University, China; ^{2}University of Electronic Science and Technology of China, China

7127
Fabrication of a New LFIA Test for Rapid Quantitative Detection of CK-MB, Using Inkjet-Printing Method
Marian Ion^{3}, *Carmen Moldovan*^{3}, *Silviu Dinulescu*^{3}, *George Muscalu*^{3}, *M. Savin*^{4}, *Carmen Mihailescu*^{1}, *Dana Stan*^{1}, *Iulia Matei*^{2}
^{1}DDS Diagnostic S.R.L., Romania; ^{2}Ilie Murgulescu Institute of Physical Chemistry of the Romanian Academy, Romania; ^{3}IMT Bucharest, Romania; ^{4}University of Bucharest, Romania

- 7129**
An HBC-Based Continuous Bio-Potential System Monitoring Using 30MHz OOK Modulation
Nicolas Fahier, Wai-Chi Fang
National Chiao Tung University, Taiwan
- 7151**
A Handheld Electrochemical Sensing Platform for Point-of-Care Diagnostic Applications
Lang Yang{2}, Tom Chen{1}
{1}Colorado State University, United States; {2}Colorado State University, United States
- 7177**
A Numerical Analysis Towards the Continuous Non-Invasive Assessment of Intra-Abdominal Pressure in Critical Patients Based on Bioimpedance and Microwave Reflectometry
Marcelo David{1}, Uriel Berkovich{1}, Francisco Pracca{2}
{1}Jerusalem College of Technology - Lev Academic Center, Israel; {2}Universidad de la Republica, Uruguay
- 7275**
A Novel Method for Pulse Transit Time Estimation Using Wrist Bio-Impedance Sensing Based on a Regression Model
Bassem Ibrahim, Ali Akbari, Roozbeh Jafari
Texas A&M University, United States
- 7289**
A Multimodal Headpatch System for Patient Brain Monitoring in or and PACU
Unsoo Ha{2}, Hoi-Jun Yoo{2}, Joonsung Bae{1}
{1}Kangwon National University, Korea; {2}Korea Advanced Institute of Science and Technology, Korea
- 7039**
A Mobile Electrochemical (Bio-)Sensor Node for a Vascular Graft Bioreactor
Christian Leibold{1}, Nils Stanislawski{1}, Cornelia Blume{2}, Holger Blume{1}
{1}Gottfried Wilhelm Leibniz Universität Hannover, Germany; {2}Leibniz University Hannover, Institute of Technical Chemistry, Germany
- 7098**
An Area/Power Efficient Electrode-Matched Neural-Spike Detector Embedded in Implantable 256-Channel MEA
Myungjin Han, Go Eun Ha, Eunji Cheong, Gunhee Han, Youngcheol Chae
Yonsei University, Korea
- 7118**
Differential Equivalent Time Sampling Receiver for Breast Cancer Detection
Yoshihiro Masui{2}, Akihiro Toya{4}, Mitsutoshi Sugawara{3}, Tomoaki Maeda{1}, Masahiro Ono{1}, Yoshitaka Murasaka{1}, Atsushi Iwata{1}, Takamaro Kikkawa{3}
{1}A-R-Tech Corporation, Japan; {2}Hiroshima Institute of Technology, Japan; {3}Hiroshima University, Japan; {4}Kure National College of Technology / Hiroshima University, Japan

- 7137**
A CMOS Front-End Interface ASIC for SiPM-Based Positron Emission Tomography Imaging Systems
Samrat Dey^{1}, Jacques Rudell^{1}, Thomas Lewellen^{2}, Robert Miyaoka^{2}
^{1}Department of Electrical Engineering, University of Washington, United States; ^{2}Department of Radiology, University of Washington, United States
- 7169**
Neural Stimulation Interface with Ultra-Low Power Signal Conditioning Circuit for Fully-Implantable Cochlear Implants
Hasan Uluşan^{1}, Salar Chamanian^{1}, Özge Zorlu^{2}, Ali Muhtaroğlu^{1}, Haluk Külâh^{1}
^{1}Middle East Technical University, Turkey; ^{2}Mikro Biyosistemler AŞ, Turkey
- 7187**
A High Frequency, High Frame Rate Front End for Electrical Impedance Tomography
Mohammad Takhti, Yueh-Ching Teng, Kofi Odame
Dartmouth College, United States
- 7215**
A Digitally Calibrated Impedance Booster Circuit for Neural Recording Systems
Nader Sherif Kassem Fathy^{2}, Mohamed El-Nozahi^{1}, Emad Hegazi^{1}
^{1}Ain Shams University, Egypt; ^{2}Mentor Graphics, A Siemens Business, Egypt
- 7228**
Evaluation of Single-Bit Sigma-Delta Modulator DAC for Electrical Impedance Spectroscopy
Mahdi Rajabzadeh, Joachim Becker, Maurits Ortmanns
Universität Ulm, Germany
- 7236**
Low Power, Low Area, Analog Blink Restoration System with Auto Sleep Mode for Unilateral Facial Paralysis Patients
Ganesh Lakshmana Kum Moganti, Sesha Sairam Regulag, D.V.Santhosh Kumar Gunapu, Siva Rama Krishna Vanjari
Indian Institute of Technology Hyderabad, India
- 7239**
Dual-Mode, Enhanced Dynamic Range CMOS Optical Sensor for Biomedical Applications
Hyunkyu Ouh, Shaan Sengupta, Soumya Bose, Matthew Johnston
Oregon State University, United States
- 7267**
Temperature Compensation for ISFETs Using a Floating Gate Current Mirror
Matthew Douthwaite, Pantelis Georgiou
Imperial College London, United Kingdom

7274

Investigation of Phase Noise and Jitter in CMOS Sampling Clock Generation Circuits for Time-Domain Breast Cancer Detection System

Akihiro Toya{4}, Yoshihiro Masui{2}, Mitsutoshi Sugawara{3}, Tomoaki Maeda{1}, Masahiro Ono{1}, Yoshitaka Murasaka{1}, Atsushi Iwata{1}, Takamaro Kikkawa{3}

{1}A-R-Tech Corporation, Japan; {2}Hiroshima Institute of Technology, Japan; {3}Hiroshima University, Japan; {4}Kure National College of Technology / Hiroshima University, Japan

7294

A Power and Area Efficient CMOS Voltage Reference with Second-Order Curvature Compensation

Junyao Tang, Chenchang Zhan, Lidan Wang

Southern University of Science and Technology, China

7203

A 71% Efficient Energy Harvesting and Power Management Unit for Sub- μ W Power Biomedical Applications

Abhishek Roy, Benton Calhoun

University of Virginia, United States

7259

An Optimized Electrotherapy Device for Overactive Bladder Treatment

Pierre-Antoine Sauriol{1}, Magdy Hassouna{2}, Mohamad Sawan{1}

{1}Polytechnique Montreal, Canada; {2}University Health Network, Toronto, Canada

11:00 – 12:30

TUTORIAL 2 – LEVENT DEGERTEKIN

Room: Aula Magna

12:30 - 13:30

LUNCH

Room: Sala Consiglio di Facoltà

13:30 – 14:30

KEYNOTE 1 – PAOLO BONATO

Room: Aula Magna

14:30 – 16:00

TUTORIAL 3 – MAURITS ORTMANN

Room: Aula Magna

16:00 – 17:00

COFFEE BREAK

Room: Sala Consiglio di Facoltà

16:00 – 17:00

POSTER SESSION: Smart Data Acquisition and Processing

Room: Sala Consiglio di Facoltà

Chairs: Sameer Sonkusale and Fernando Corinto

7063

Development of a System for on-Disc Isothermal in Vitro Amplification and Detection of Bacterial RNA

Des Brennan{4}, Helena Coughlan{2}, Eoin Clancy{2}, Nikolay Dimov{1}, Thomas Barry{2}, David Kinahan{1}, Jens Ducreé{1}, Terry Smith{2}, Paul Galvin{3}

{1}Biomedical Diagnostics Institute, Dublin City University, Ireland; {2}National University of Ireland, Galway, Ireland; {3}Tyndall National Institute, Ireland; {4}Tyndall National Institute / University College Cork, Ireland

7064

Power/Data Platform for High Data Rate in Implanted Neural Monitoring System

Kerim Ture{1}, Reza Ranjandish{1}, Gürkan Yilmaz{1}, Stefanie Seiler{2}, Hans Rudolf Widmer{2}, Alexandre Schmid{1}, Franco Maloberti{3}, Catherine Dehollain{1}

{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Inselspital, University of Bern, Switzerland; {3}Università degli Studi di Pavia, Switzerland

7089

Cortical Motor Intention Decoding on an Analog Co-Processor with Fast Training for Non-Stationary Data

Shoeb Shaikh{2}, Chen Yi{2}, Arindam Basu{2}, Rosa So{1}

{1}Institute for Infocomm Research, Singapore; {2}Nanyang Technological University, Singapore

7097

Activity Dependent Structural Plasticity in Neuromorphic Systems

Richard George{2}, Giacomo Indiveri{2}, Stefano Vassanelli{1}

{1}Università degli Studi di Padova, Italy; {2}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland

7104

Robust State-Dependent Computation in Neuromorphic Electronic Systems

Dongchen Liang, Giacomo Indiveri

Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland

7109

In-Vivo Imaging of Neural Activity with Dynamic Vision Sensors

Gemma Taverni{5}, Diederik Moeys{5}, Fabian Voigt{4}, Chenghan Li{3}, Celso Cavaco{2}, Vasyi Motsnyi{2}, Stewart Berry{4}, Pia Sipilä{4}, David Bello{2}, Fritjof Helmchen{4}, Tobi Delbruck{1}

{1}Eidgenössische Technische Hochschule Zürich, Switzerland; {2}imec, Belgium; {3}Inilabs, Switzerland; {4}Universität Zürich, Switzerland; {5}University of Zurich, Switzerland

7117

Neural Spikes Digital Detector/Sorting on FPGA

Elia Arturo Vallicelli{1}, Marcello De Matteis{1}, Andrea Baschirotto{1}, Michael Rescati{1}, Marco Reato{2}, Marta Maschietto{2}, Stefano Vassanelli{2}, Daniele Guarrera{2}, Gianmaria Collazuol{2}, Ralf Zeiter{3}

{1}Università degli Studi di Milano-Bicocca, Italy; {2}Università degli Studi di Padova, Italy; {3}Venneos GmbH, Germany

7167

A Deep Belief Network System for Prediction of DNA Methylation

Mohammed Khwaja, Melpomeni Kalofonou, Chris Toumazou
Imperial College London, United Kingdom

7181

A Chronic Implantable EMG Recording System with Wireless Power and Data Transfer

Marshal Dian Sheng Wong{2}, Kian Ann Ng{2}, Sudip Nag{4}, Rangarajan Jegadeesan{2}, Khay-Wai Leong{2}, Li Jing Ong{2}, Astrid Rusly{2}, Monzurul Alam{3}, Gil Gerald Lasam Gammad{2}, Chne Wuen Tsai{2}, Shih-Chiang Liu{2}, Kai Voges{2}, Nitish Vyomesh Thako

{1}Johns Hopkins University / National University of Singapore, Singapore; {2}National University of Singapore, Singapore; {3}National University of Singapore / Hong Kong Polytechnic University, Singapore; {4}National University of Singapore / Indian Inst

7197

Effect of Model Complexity on Fiber Activation Estimates in a Wearable Neuromodulator for Migraine

Enver Salkim, Arsam N. Shiraz, Andreas Demosthenous
University College London, United Kingdom

7198

A 250Mbps 24pJ/Bit UWB-Inspired Optical Communication System for Bioimplants

Andrea De Marcellis{2}, Elia Palange{2}, Marco Faccio{2}, Guido Di Patrizio Stanchieri{2}, Timothy G. Constandinou{1}

{1}Imperial College London, United Kingdom; {2}Università degli Studi dell'Aquila, Italy

7207

FAR: a 4.12μW Ferro-Electric Auto-Recovery for Battery-Less BSN SoCs

Farah B. Yahya{2}, Christopher J. Lukas{2}, Benton H. Calhoun{2}, Steven Bartling{1}
{1}Texas Instruments, United States; {2}University of Virginia, United States

7219

Single-Pulse Harmonic Modulation for Short Range Biomedical Inductive Data Transfer

Matthew Schormans, Virgilio Valente, Andreas Demosthenous
University College London, United Kingdom

7229

An in-Situ Phase-Preserving Data Decimation Method for High-Channel-Count Wireless μECoG Arrays

Sylmarie Dávila-Montero, Andrew Mason
Michigan State University, United States

7244

Differences Between Model-Based Electrocardiogram T Wave Features Before and After Haemodialysis

Ana Rodrigues{2}, Vaidotas Marozas{2}, Saulius Daukantas{2}, Neda Kušleikaitė-Pere{3}, Irmantė Štramaitytė{3}, Inga Arūnė Bumblytė{3}, Eleni Kaldoudi{1}

{1}Democritus University of Thrace, Greece; {2}Kaunas University of Technology, Lithuania; {3}Lithuanian University of Health Sciences, Lithuania

7292

EMG-Based Biofeedback System for Motor Rehabilitation: a Pilot Study

Michela Di Girolamo{3}, Nicolò Celadon{1}, Silvia Appendino{3}, Andrea Turolla{2}, Paolo Ariano{1}
{1}Istituto Italiano di Tecnologia, Italy; {2}Ospedale San Camillo, Italy; {3}Politecnico di Torino, Italy

17:00 – 18:30

TUTORIAL 4 – MAAIKE OP DE BEECK

Room: Aula Magna

18:30 - 19:00

Educational Factory - Training and Innovation: How to Re-design effectively our future together

Room: Aula Magna

19:00 – 22:00

WELCOME RECEPTION & LIVE DEMOS

Room: Sala Consiglio di Facoltà

7227

Live Demonstration: Enhancing Biomedical Research Precision, Productivity and Reproducibility via Autonomous Data Acquisition and Robust Data Curation

Yousef Gtat, Andrew Mason

Michigan State University, United States

7295

Live Demonstration: Inexpensive 1024-Channel 3D Telesonography System on FPGA

Aya Ibrahim, Damien Doy, Claudio Loureiro, Eliéva Pignat, Federico Angiolini, Marcel Arditi, Jean-Philippe Thiran, Giovanni De Micheli

École Polytechnique Fédérale de Lausanne, Switzerland

7296

Live Demonstration: BCT-II – a Hand-Held, Stand-Alone, Multimodal Bio-Sensing System

Takeshi Shimizu{1}, Masaki Tanaka{2}, Kazuo Nakazato{1}

{1}Nagoya University, Japan; {2}Showa University, Japan

7297

Live Demonstration: an IoT SmartWatch-Based System for Intensive Care Monitoring

Francesca Stradolini{1}, Eleonora Lavalle{2}, Paolo Motto Ros{3}, Giovanni De Micheli{1}, Danilo Demarchi{4}, Sandro Carrara{1}

{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}École Polytechnique Fédérale de Lausanne / Politecnico di Torino, Italy; {3}Istituto Italiano di Tecnologia, Italy; {4}Politecnico di Torino, Italy

7298

Live Demonstration: a Ring-Type Blood Pressure Monitoring System Based on Photoplethysmography

Min Wang{2}, Mohamed Atef{1}, Qingsong Xie{2}, Yong Lian{2}, Guoxing Wang{2}

{1}Assiut University, Egypt; {2}Shanghai Jiao Tong University, China

7299

Live Demonstration: Continuous Active Probing and Modulation of Neural Networks with a Wireless Implantable System

Vaclav Kremen{1}, Benjamin Brinkmann{1}, Inyong Kim{1}, Su-Youne Chang{1}, Jamie Van Gompel{1}, Jeffrey Herron{2}, Steven Baldassano{4}, Edward Patterson{3}, Brian Litt{4}, Timothy Denison{2}, Gregory Worrell{1}

{1}Mayo Clinic, United States; {2}Medtronic, United States; {3}University of Minnesota College of Veterinary Medicine, United States; {4}University of Pennsylvania, United States

7300

Live Demonstration: a Batteryless CMOS ISFET Array Powered by Body Heat for Real-Time Monitoring of Bio-Fluids

Matthew Douthwaite, Pantelis Georgiou

Imperial College London, United Kingdom

7301

Live Demonstration:Wireless Intracranial Pressure Monitoring System Based on an Air Pressure Sensor

Zeliang Wu{2}, Hanjun Jiang{2}, Yanshu Guo{2}, Chun Zhang{2}, Wen Jia{1}, Zhihua Wang{2}

{1}Research Institute of Tsinghua University in Shenzhen, Guangdong, China, China; {2}Tsinghua University, China

7302

Live Demonstration: Programmable Biphasic Multi-Channel Constant Current Muscle Stimulator with Wireless Power and Data Transfer

Li Jing Ong{2}, Marshal Dian Sheng Wong{2}, Shih-Chiang Liu{2}, Astrid Rusly{2}, Chne Wuen Tsai{2}, Khay-Wai Leong{2}, Kian Ann Ng{2}, Rangarajan Jegadeesan{2}, Kai Voges{2}, Nitish Vyomesh Thakor{1}, Shih-Cheng Yen{2}, Sudip Nag{3}

{1}Johns Hopkins University / National University of Singapore, Singapore; {2}National University of Singapore, Singapore; {3}National University of Singapore / Indian Institute of Technology Kharagpur, India

7303

Live Demonstration: a Versatile Electrode Sorting Module for MEAs: Implementation in a FPGA-Based Real-Time System

Antoine Pirog{2}, Yannick Bornat{2}, Sylvie Renaud{2}, Romain Perrier{1}, Manon Jaffredo{1}, Matthieu Raoux{1}, Jochen Lang{1}

{1}Université de Bordeaux, France; {2}Université de Bordeaux / IMS Laboratory, France

7304

Live Demonstration: in-Vivo Imaging of Neural Activity with Dynamic Vision Sensors

Gemma Taverni{5}, Diederik Moeys{5}, Fabian Voigt{4}, Chenghan Li{3}, Celso Cavaco{2}, Vasyi Motsnyi{2}, Stewart Berry{4}, Pia Sipilä{4}, David Bello{2}, Fritjof Helmchen{4}, Tobi Delbruck{1}
{1}Eidgenössische Technische Hochschule Zürich, Switzerland; {2}imec, Belgium; {3}Inilabs, Switzerland;
{4}Universität Zürich, Switzerland; {5}University of Zurich, Switzerland

7305

Live Demonstration: a VCO-Based Point-of-Care ESR Spectrometer

Anh Chu{2}, Benedikt Schlecker{2}, Jonas Handwerker{2}, Silvio Künstner{1}, Maurits Ortmanns{2}, Klaus Lips{1}, Jens Anders{2}
{1}Helmholtz-Zentrum Berlin, Germany; {2}Universität Ulm, Germany

7306

Live Demonstration: a Closed-Loop Cortical Brain Implant for Optogenetic Curing Epilepsy

Junwen Luo{2}, Dimitrios Firfilionis{2}, Reza Ramezani{2}, Fahimeh Dehkhoda{2}, Ahmed Soltan{2}, Patrick Degenaar{2}, Yan Liu{1}, Timothy Constandinou{1}
{1}Imperial College London, United Kingdom; {2}Newcastle University, United Kingdom

7307

Live Demo: Platform for Closed Loop Neuromodulation Based on Dual Mode Biosignals

Khalid Mirza, Krzysztof Wildner, Nishanth Kulasekeram, Simon Cork, Steve Bloom, Konstantin Nikolic, Chris Toumazou
Imperial College London, United Kingdom

7308

Live Demonstration: Targeted Transcutaneous Electrical Nerve Stimulation for Phantom Limb Sensory Feedback

Luke Osborn{2}, Joseph Betthausen{2}, Rahul Kaliki{1}, Nitish Vyomesh Thakor{3}
{1}Infinite Biomedical Technologies / Johns Hopkins University, United States; {2}Johns Hopkins University, United States; {3}Johns Hopkins University / National University of Singapore, United States

7309

Live Demonstration: a Real-Time Measurement System for Pose of Anterior Pelvic Plane and Implantation Angles of Prosthesis in THR Surgeries

Zhe Cao, Hong Chen, Shaojie Su, Zhihua Wang
Tsinghua University, China

7310

Live Demonstration: a Hand Gesture Recognition Wristband Employing Low Power Body Channel Communication

Jingna Mao{1}, Jian Zhao{1}, Guijin Wang{1}, Huazhong Yang{1}, Bo Zhao{2}
{1}Tsinghua University, China; {2}University of California at Berkeley, United States

7314

Live Demonstration: Tactile Events from Off-the-Shelf Sensors in a Robotic Skin

Chiara Bartolozzi, Paolo Motto Ros, Francesco Diotalevi, Marco Crepaldi
Istituto Italiano di Tecnologia, Italy

7316
Live Demonstration: 3D Wound Detection & Tracking System Based on Artificial Intelligence Algorithm
Marco Farina, Jacopo Secco
Politecnico di Torino, Italy

BioCAS 2017 – FRIDAY, OCTOBER 20th

7:30 – 18:00
REGISTRATION
Room: Foyer

8:00 – 9:30
LECTURE SESSION: Biomedical Imaging
Room: Aula Magna
Session Chair: Alejandro Linares-Barranco

CMOS Fluorescence Lifetime to Frequency Converter with Background Calibration

Guoqing Fu, Sameer Sonkusale
Tufts University, United States

Adaptive Method for MRI Enhancement Using Squared Eigenfunctions of the Schrödinger Operator

Abderrazak Chahid^{2}, Hacene Serrai^{1}, Eric Achten^{1}, Taous-Meriem Laleg-Kirati^{2}
^{1}Department of Radiology, University of Gent, Belgium; ^{2}King Abdullah University of Science and Technology, Saudi Arabia

Inexpensive 1024-Channel 3D Telesonography System on FPGA

Aya Ibrahim, Damien Doy, Claudio Loureiro, Eliéva Pignat, Federico Angiolini, Marcel Ardit, Jean-Philippe Thiran, Giovanni De Micheli
École Polytechnique Fédérale de Lausanne, Switzerland

Guide Image Based Enhancement Method for Wireless Capsule Endoscopy

Mingzhu Long^{1}, Zhuo Li^{1}, Yuchi Zhang^{1}, Xiang Xie^{1}, Guolin Li^{1}, Shigang Yue^{2}, Zhihua Wang^{1}
^{1}Tsinghua University, China; ^{2}university of lincoln, United Kingdom

Beyond Supply-Voltage Bootstrapped Pulser for Driving CMUT Arrays in Ultrasound Imaging

Gwangrok Jung, Coskun Tekes, Amirabbas Pirouz, Levent Degertekin, Maysam Ghovanloo
Georgia Institute of Technology, United States

9:30 – 10:30
COFFEE BREAK
Foyer

9:30 – 10:30

POSTER SESSION: Wireless & Wearable Technology

Room: Sala Consiglio di Facoltà

Session Chair: Kiichi Niitsu

7019

Modeling of mm-Sized Solenoid Coils with Ferrite Tube Core for Biomedical Implants

Yuhua Cheng{2}, Dongdong Xuan{2}, Gaorong Qian{2}, Guoxiong Chen{2}, Maysam Ghovanloo{1}, Gaofeng Wang{2}

{1}Georgia Institute of Technology, United States; {2}Hangzhou Dianzi University, China

7046

Efficient Through-Waveguide Wireless Power Transfer for Body Area Networks

Alexander Vorobyov{1}, Vladimir Kopta{2}, John Farserotu{1}, Christian Enz{2}

{1}CSEM, Switzerland; {2}École Polytechnique Fédérale de Lausanne, Switzerland

7049

A Sub-GHz UWB Data Transmitter with Enhanced Output Amplitude for Implantable Bioelectronics

Xingyuan Tong, Jie Li

Xi'an University of Posts and Telecommunications, China

7176

An Adaptable Interface Circuit for Low Power MEMS Piezoelectric Energy Harvesters with Multi-Stage Energy Extraction

Salar Chamanian{1}, Hasan Uluşan{1}, Özge Zorlu{2}, Ali Muhtaroğlu{1}, Haluk Külâh{1}

{1}Middle East Technical University, Cyprus; {1}Middle East Technical University, Turkey; {2}Mikro Biyosistemler AŞ, Turkey

7251

Ultrasonic Wireless Powering Link of Visual Cortical Prosthesis Implant

Banafsaj Jaafar, Jeff Neasham, Graeme. Chester, Patrick Degenaar

Newcastle University, United Kingdom

7261

Using Human Body As a Monopole Antenna for Energy Harvesting from Ambient Electromagnetic Energy

Jingna Mao{1}, Jian Zhao{1}, Huazhong Yang{1}, Bo Zhao{2}

{1}Tsinghua University, China; {2}University of California at Berkeley, United States

7034

Training a Classifier for Activity Recognition Using Body Motion Simulation

Michelangelo Grosso{2}, Davide Lena{2}, Salvatore Rinaudo{2}, David Fernández Guzmán{1}, Danilo Demarchi{1}

{1}Politecnico di Torino, Italy; {2}STMicroelectronics srl, Italy

7035

Evaluation of Tactile Sensors As an Alternative to Force Sensors in an Assistive Haptic Handlebar

Andrés Trujillo-León{1}, Fernando Vidal-Verdú{1}, Wael Bachta{2}

{1}Universidad de Málaga, Spain; {2}Université Pierre-et-Marie-Curie, France

- 7087**
Area and Power Optimised ASIC Implementation of Adaptive Beamformer for Hearing Aids
Kartik Samtani, Jobin Thomas, Deepu S. P., Sumam David S.
National Institute of Technology Karnataka, India
- 7108**
Comparison of Real and Virtual Rehabilitation Using Hand Measurement Device Based on Six-Axis Inertial Sensors
Yujiro Tsuzuki, Kouki Nagamune
University of Fukui, Japan
- 7260**
A Compact Size Charge-Mode Stimulator Using a Low-Power Active Charge Balancing Method for Deep Brain Stimulation (DBS)
Reza Ranjandish, Alexandre Schmid
École Polytechnique Fédérale de Lausanne, Switzerland
- 7271**
An Objective Assessment to Investigate the Impact of Turning Angle on Freezing of Gait in Parkinson's Disease
Matilde Bertoli{2}, Andrea Cereatti{2}, Ugo Della Croce{2}, Martina Mancini{1}
{1}Oregon Health and Science University, United States; {2}Università degli Studi di Sassari, Italy
- 7008**
An Energy-Efficient and Delay-Constrained Resource Allocation Scheme for Periodical Monitoring Traffic in SmartBANs
Jaume Ramis-Bibiloni, Loren Carrasco-Martorell
Universitat de les Illes Balears, Spain
- 7238**
A 3.77 nW, 11.4 fJ/b/mm Link for Reliable Wireline Communication in Ultra-Low Power on-Body Sensor Networks
Christopher Lukas{2}, Benton Calhoun{2}, Raj Bhakta{1}, Jesse Jur{1}
{1}North Carolina State University, United States; {2}University of Virginia, United States
- 7263**
A Proof-of-Concept Wearable Photoplethysmography Sensor-Node for Near Real-Time Pulse Transit Time Measurements
Kenan çağrı Hırlak{1}, Zübeyr Furkan Eryılmaz{1}, Makbule Kübra Korkmaz{1}, Hakan Töreyn{2}
{1}Bilkent University, Turkey; {2}San Diego State University, United States
- 7272**
SCAVM: a Self-Powered Cardiac and Activity Vigilant Monitoring System
Luis Lopez Ruiz{2}, Matthew Ridder{2}, Daewi Fan{2}, Jiaqi Gong{2}, John Lach{2}, Jason Strohmaier{1}
{1}North Carolina State University, United States; {2}University of Virginia, United States
- 7055**
Population Health Management Outcomes Obtained Through a Hospital-Based and Telehealth Informatics-Enabled Telecare Service
Ching-Kuan Liu{2}, Chung-Yao Hsu{2}, Feng-Yueh Yang{2}, Jasmine Wu{1}, Kayla Kuo{1}, Por Lai{1}
{1}Crux Health Technologies Co., Ltd., Taiwan; {2}Kaohsiung Medical University, Taiwan

7209

ABBI: a Wearable Device for Improving Spatial Cognition in Visually-Impaired Children

*Lope Ben Porquis, Sara Finocchietti, Giorgio Zini, Giulia Cappagli, Monica Gori, Gabriel Baud-Bovy
Istituto Italiano di Tecnologia, Italy*

7226

A Wireless, Minaturized Multi-Channel sEMG Acquisition System for Use in Dynamic Tasks

*Giacinto Luigi Cerone, Marco Gazzoni
Politecnico di Torino, Italy*

7014

Bio-Inspired Active Amplification in a MEMS Microphone Using Feedback Computation

*José Guerreiro, Andrew Reid, Joseph Jackson, James Windmill
University of Strathclyde, United Kingdom*

7077

CPG-Based Circuitry for Controlling Musculoskeletal Model of Human Locomotor System

*Andrii Shachykov{3}, Patrick Henaff{2}, Anton Popov{1}, Alexander Shulyak{1}
{1}National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine;
{2}Université de Lorraine / CNRS - Inria, France; {3}Université de Lorraine-INRIA-CNRS, Ukraine*

7144

Bursting Through Interconnection of Excitable Circuits

*Luka Ribar, Rodolphe Sepulchre
University of Cambridge, United Kingdom*

7164

A Wireless Opto-Electro Neural Interface for Experiments with Small Freely-Behaving Animals

*Yaoyao Jia{1}, Wasif Khan{2}, B. Lee{1}, B. Fan{2}, Yue Guo{2}, F. Madi{2}, A. J. Weber{2}, Wen Li{2},
Maysam Ghovanloo{1}
{1}Georgia Institute of Technology, United States; {2}Michigan State University, United States*

10:30 – 12:00

LECTURE SESSION: Biosensor Devices

Room: Aula Magna

Session Chair: Gert Cauwenberghs

Raspberry Pi Driven Flow-Injection System for Electrochemical Continuous Monitoring Platforms

*Bruno Donato{3}, Francesca Stradolini{1}, Abuduwaili Tuoheti{2}, Federico Angiolini{1}, Danilo Demarchi{4}, Giovanni De Micheli{1}, Sandro Carrara{1}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}École Polytechnique Fédérale de Lausanne / Politecnico di Torino, Italy; {3}École Polytechnique Fédérale de Lausanne / Sapienza – Università di Roma, Switzerland; {4}Politecnico di Torino, Italy*

Towards a Biohybrid Sensing Platform Built on Impedance-Based Bacterial Flagellar Motor Tachometry

*Tom Zajdel{3}, Alexander Walczak{5}, Debleena Sengupta{4}, Victor Tieu{2}, Behzad Rad{1}, Michel Maharbiz{3}
{1}Lawrence Berkeley National Laboratory, United States; {2}Stanford University, United States;
{3}University of California, Berkeley, United States; {4}University of California, Los Angeles, United States;
{5}University of Washington, United States*

Improving the pH Sensitivity of ISFET Arrays with Reactive Ion Etching

*Nicolas Moser, Christoforos Panteli, Dora Ma, Chris Toumazou, Kristel Fobelets, Pantelis Georgiou
Imperial College London, United Kingdom*

A Portable System for Real-Time Non-Contact Blood Oxygen Saturation Measurements

*Deepak Mishra, Shivam Chandra, Abhay Chandra, Siddhant Jain, Mukul Sarkar
Indian Institute of Technology Delhi, India*

Bio-Impedance Spectroscopy (BIS) Measurement System for Wearable Devices

*Bassem Ibrahim^{1}, Drew Hall^{2}, Roozbeh Jafari^{1}
^{1}Texas A&M University, United States; ^{2}University of California, San Diego, United States*

12:00 – 13:00

LUNCH

Sala Consiglio di Facoltà

13:00 – 14:00

KEYNOTE 2: GIANLUCA PETTITI

Room: Aula Magna

14:00 – 15:30

LECTURE SESSION: Biosignal Recording

Room: Aula Magna

Session Chairs: Laleh Najafizadeh and Jennifer Blain Christen

Approach to Compensate Measurement Errors in Electrical Impedance Tomography

*Tobias Menden, Jakob Orschulik, Toni Tholen, Steffen Leonhardt, Marian Walter
Rheinisch-Westfälische Technische Hochschule Aachen, Germany*

Real-Time Classification Technique for Early Detection and Prevention of Myocardial Infarction on Wearable Devices

*Dionisije Sopic^{1}, Amin Aminifar^{2}, Amir Aminifar^{1}, David Atienza^{1}
^{1}École Polytechnique Fédérale de Lausanne, Switzerland; ^{2}Khajeh Nasir Toosi University, Iran*

An Implementation of Motion Artifacts Elimination for PPG Signal Processing Based on Recursive Least Squares Adaptive Filter

*Chih-Chin Wu, I-Wei Chen, Wai-Chi Fang
National Chiao Tung University, Taiwan*

Spectral and Time-Frequency Domains Features for Quantitative Lower-Limb Rehabilitation Monitoring via Wearable Inertial Sensors

*Salvatore Tedesco, Andrea Urru, Brendan O'Flynn
Tyndall National Institute / University College Cork, Ireland*

Low-Complexity Greedy Algorithm in Compressed Sensing for the Adapted Decoding of ECGs

*Alex Marchioni^{2}, Mauro Mangia^{2}, Fabio Pareschi^{1}, Riccardo Rovatti^{2}, Gianluca Setti^{1}
^{1}Università degli Studi di Ferrara, Italy; ^{2}Università di Bologna, Italy*

15:30 – 16:30
COFFEE BREAK
Sala Consiglio di Facoltà

15:30 – 16:30
POSTER SESSION: Biosignal Recording & Processing
Room: Sala Consiglio di Facoltà
Session Chairs: Hanjun Jiang and Laleh Najafizadeh

7030
Towards More Efficient Objective Tests of Hearing Thresholds: Phase Based Detection of Cortical Auditory Responses

*Darren Mao{3}, Hamish Innes-Brown{1}, Matthew Petoe{1}, Yan Wong{2}, Colette McKay{1}
{1}Bionics Institute, Australia; {2}Monash University, Australia; {3}University of Melbourne, Australia*

7036
A 2:1 μ W Event-Driven Wake-Up Circuit Based on a Level-Crossing ADC for Pattern Recognition in Healthcare

*Giovanni Rovere, Schekeb Fateh, Luca Benini
Eidgenössische Technische Hochschule Zürich, Switzerland*

7051
Ankle Muscles Co-Activation During Walking: a Gender Comparison in Adults and Children
*Alessandro Mengarelli{2}, Annachiara Strazza{2}, Sandro Fioretti{2}, Laura Burattini{2}, Francesco Di Nardo{2}, Valentina Agostini{1}, Marco Knaflitz{1}
{1}Politecnico di Torino, Italy; {2}Università Politecnica delle Marche, Italy*

7059
Inpainting Makes Every Sample Count
*Sebastian Schmale, Steffen Paul
Universität Bremen, Germany*

7067
Impedance Spectroscopy Systems: Review and an All-Digital Adaptive IIR Filtering Approach
*Nikola Ivanisevic, Saul Rodriguez, Ana Rusu
KTH Royal Institute of Technology, Sweden*

7072
A Low Complexity Patient-Specific Threshold Based Accelerator for the Grand-Mal Seizure Disorder
*Muhammad Rizwan Khan, Wala Saadeh, Muhammad Awais Bin Altaf
Lahore University of Management Sciences, Pakistan*

7082

A Neural Recording Amplifier Based on Adaptive SNR Optimization Technique for Long-Term Implantation

Taeju Lee{4}, Doojin Jang{4}, Yoontae Jung{4}, Hyuntak Jeon{4}, Soonyoung Hong{1}, Sungmin Han{3}, Jun-Uk Chu{2}, Junghyup Lee{1}, Minkyu Je{4}

{1}Daegu Gyeongbuk Institute of Science and Technology, Korea; {2}KIMM, Korea; {3}KIST, Korea; {4}Korea Advanced Institute of Science and Technology, Korea

7092

An Electrocardiography System Design for Obstructive Sleep Apnea Detection Based on Improved Lomb Frequency Analysis Algorithm

Wai-Chi Fang{1}, I-Wei Chen{1}, Shu-Han Fan{1}, Chih-Kuo Lee{2}

{1}National Chiao Tung University, Taiwan; {2}National Taiwan University Hospital, Hsin-Chu Branch, Taiwan

7105

Very Low Power Event-Based Surface EMG Acquisition System with Off-the-Shelf Components

David Alejandro Fernandez Guzman{2}, Stefano Sapienza{2}, Bianca Sereni{2}, Paolo Motto Ros{1}

{1}Istituto Italiano di Tecnologia, Italy; {2}Politecnico di Torino, Italy

7106

Stability Improvement and Noise Suppression in Non-Contact in-Bed Electrocardiogram Measurement Using Laminated Feedback Electrode

Mayuko Takano, Hiromu Komiya, Akinori Ueno

Tokyo Denki University, Japan

7115

A Versatile Electrode Sorting Module for MEAs: Implementation in a FPGA-Based Real-Time System

Antoine Pirog{2}, Yannick Bornat{2}, Sylvie Renaud{2}, Romain Perrier{1}, Manon Jaffredo{1}, Matthieu Raoux{1}, Jochen Lang{1}

{1}Université de Bordeaux, France; {2}Université de Bordeaux / IMS Laboratory, France

7119

Sparse Sensing Matrix Based Compressed Sensing in Low-Power ECG Sensor Nodes

Alex Marchioni{2}, Mauro Mangia{2}, Fabio Pareschi{1}, Riccardo Rovatti{2}, Gianluca Setti{1}

{1}Università degli Studi di Ferrara, Italy; {2}Università di Bologna, Italy

7136

Epileptic Seizure Detection Based on Video and EEG Recordings

Hoda Aghaei{2}, Mahdi Kiani{2}, Hamid Aghajan{1}

{1}Gent University, Belgium; {2}Sharif University of Technology, Iran

7175

Heart Wall Velocity Sensing Using Pulsed Radar

Kristian Kjølgaard{3}, Mathias Tømmer{3}, Tor Sverre Lande{3}, Dag Trygve Wisland{3}, Stig Støa{1}, Lars Gunnar Klæboe{2}, Thor Edvardsen{2}

{1}Novelda AS, Norway; {2}Oslo University Hospital, Norway; {3}University of Oslo, Norway

7184

Compressed Estimation of Heart and Respiratory Rates from a Photoplethysmogram

Chanki Park, Boreom Lee

Gwangju Institute of Science and Technology, Korea

Power Analysis of a Mobile EEG System with Compressed Sensing

Bathiya Senevirathna, Pamela Abshire

University of Maryland, United States

7234

Non-Contact Biometric Identification and Authentication Using Microwave Doppler Sensor

Takaaki Okano, Shintaro Izumi, Hiroshi Kawaguchi, Masahiko Yoshimoto

Kobe University, Japan

7268

A Miniaturized Wearable Wireless Hand Gesture Recognition System Employing Deep-Forest Classifier

Jian Zhao{1}, Jingna Mao{1}, Guijin Wang{1}, Huazhong Yang{1}, Bo Zhao{2}

{1}Tsinghua University, China; {2}University of California at Berkeley, United States

7269

Capacitively Coupled ECG Sensor System with Digitally Assisted Noise Cancellation for Wearable Application

Yuki Nagasato, Shintaro Izumi, Hiroshi Kawaguchi, Masahiko Yoshimoto

Kobe University, Japan

7277

Wearable 3D Lung Ventilation Monitoring System with Multi Frequency Electrical Impedance Tomography

Minseo Kim{2}, Joonsung Bae{1}, Hoi-Jun Yoo{2}

{1}Kangwon National University, Korea; {2}Korea Advanced Institute of Science and Technology, Korea

7282

A Computational Framework for Effective Isolation of Single-Unit Activity from in-Vivo Electrophysiological Recording

Hristos Courellis, Samuel Nummela, Cory Miller, Gert Cauwenberghs

University of California, San Diego, United States

7283

Ultrawide Range Square Wave Impedance Analysis Circuit with Ultra-Slow Ring-Oscillator Using Gate-Induced Drain-Leakage Current

Yoshiki Takezawa{2}, Koji Kiyoyama{1}, Kenji Shimokawa{2}, Zhengyang Qian{2}, Hisashi Kino{2}, Takafumi Fukushima{2}, Tetsu Tanaka{2}

{1}Nagasaki Institute of Applied Science, Japan; {2}Tohoku University, Japan

7291

Hardware-Oriented Algorithm for Phase Synchronization Analysis of Biomedical Signals

Tomoki Sugiura, Jaehoon Yu, Yoshinori Takeuchi

Osaka university, Japan

16:30 – 18:00

LECTURE SESSION: Bio-inspired Circuits

Room: Aula Magna

Session Chairs: Zhihua Wang and Abe Elfadel

From LIF to AdEx Neuron Models: Accelerated Analog 65 nm CMOS Implementation

*Syed Ahmed Aamir, Paul Müller, Laura Kriener, Gerd Kiene, Johannes Schemmel, Karlheinz Meier
Ruprecht-Karls-Universität Heidelberg, Germany*

On-Chip Unsupervised Learning in Winner-Take-All Networks of Spiking Neurons

*Raphaela Kreiser^{1}, Timoleon Moraitis^{2}, Yulia Sandamirskaya^{1}, Giacomo Indiveri^{1}
^{1}Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland; ^{2}University of
Zurich and ETH Zurich, Switzerland*

Capacitor-Less RRAM-Based Stochastic Neuron for Event-Based Unsupervised Learning

*Jie Lin, Jiann-Shiun Yuan
University of Central Florida, United States*

A Low Power Architecture for AER Event-Processing Microcontroller

*Simone Aiassa^{2}, Paolo Motto Ros^{1}, Guido Masera^{2}, Maurizio Martina^{2}
^{1}Istituto Italiano di Tecnologia, Italy; ^{2}Politecnico di Torino, Italy*

Parallel Distribution of an Inner Hair Cell and Auditory Nerve Model for Real-Time Application

*Robert James, Jim Garside, Michael Hopkins, Luis Plana, Steve Temple, Simon Davidson, Steve Furber
University of Manchester, United Kingdom*

18:45 – 24:00

GALA DINNER

Location: la Venaria Reale

FoodCAS 2017 – FRIDAY, OCTOBER 20th

****ALL FOODCAS 2017 SESSIONS WILL TAKE PLACE AT POLITECNICO DI TORINO,
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATIONS, CORSO CASTELFIDARDO
42/A, 5TH FLOOR MEETING ROOM****

8:45 – 9:00

OPENING

9:00 – 9:45

KEYNOTE 1: JOHN P. VERBONCOEUR

9:45 – 11:00

LECTURE SESSION: Foods-I

Session Chairs: Danilo Demarchi and Mohamad Sawan

VCO-Based ESR-on-a-Chip As a Tool for Low-Cost, High-Sensitivity Food Quality Control

Anh Chu{2}, Benedikt Schlecker{2}, Jonas Handwerker{2}, Silvio Künstner{1}, Maurits Ortmanns{2}, Klaus Lips{1}, Jens Anders{2}
{1}Helmholtz-Zentrum Berlin, Germany; {2}Universität Ulm, Germany

Authentication and Traceability of Food Products Through the Supply Chain Using NQR Spectroscopy

Fengchao Zhang{2}, Naren Masna{2}, Swarup Bhunia{2}, Cheng Chen{1}, Soumyajit Mandal{1}
{1}Case Western Reserve University, United States; {2}University of Florida, United States

Fast Food Safety Screening with CMOS High-Sensitivity Large-Arrayed ISFET Sensor

Yu Jiang{1}, Philippe Coquet{1}, Hao Yu{2}
{1}Nanyang Technological University, Singapore; {2}Southern University of Science and Technology, China

Integrated Platform for Pesticides Detection in Food

Carmen Moldovan{2}, Bogdan Firtat{2}, Silviu Dinulescu{2}, Costin Brasoveanu{2}, Marian Ion{2}, Cecilia Codreanu{2}, Carmen Mihailescu{1}, Dana Stan{1}, Mihaela Savin{1}
{1}DDS Diagnostic S.R.L., Romania; {2}IMT Bucharest, Romania

XSpectra®: The Most Advanced Real Time Food Contaminants Detector

Bruno Garavelli, Andrea Mencarelli, Luca Zanotti
Xnext s.r.l., Italy

11:00 – 11:15

BREAK

11:15 – 12:30

LECTURE SESSION: Foods-II

Session Chairs: Danilo Demarchi and Mohamad Sawan

Development of an Electrochemical Caffeine Sensor for PAT Application in the Food and Beverage Industry

Shauna Scanlon{2}, Walter Messina{3}, Eric Moore{3}, Sharon Rothwell{1}, Scott Harrison{1}{1}PepsiCo International, Ireland; {2}Tyndall National Institute, Ireland; {3}Tyndall National Institute & School of Chemistry, Ireland

A Feasibility Study for CO2 Detection in Coffee Degassing Process

*Damiano Sonnante
Lavazza SpA, Italy*

Near-Infrared Nondestructive Evaluation of Food Based on Multi-Frequency Lock-in Detection

Pietro Burrascano{1}, Luca Senni{1}, Marco Ricci{2}{1}Università degli Studi di Perugia, Italy; {2}Università della Calabria, Italy

Smart Micro-Sensing: Antibodies and Aptamer-Based Micro- ELISA As Performing off Line/On Line Tool for Allergens and Mycotoxins Detection in Foods

L. Boschis{2}, N. Ciprianetti{2}, D. Spadaro{3}, M.L. Gullino{3}, R. Rinaldi{1}, C. Garino{4}, M. Arlorio{4}{1}aizoOn Consulting Technology, Italy; {2}Trustech s.r.l., Italy; {3}Università degli Studi di Torino, Italy; {4}Università del Piemonte Orientale A. Avogadro, Italy

GreenPallet: Systemic Approach and Electronics to Improve the Food Transportation System

*Franco Fassio, Alberto Tallone
Università degli Studi di Scienze Gastronomiche, Italy*

12:30 – 14:00

LUNCH

14:00 – 14:45

KEYNOTE 2: SØREN BALLING ENGLESEN

14:45 – 16:15

LECTURE SESSION: Milk, Drink, Meat and Plants

Session Chairs: Danilo Demarchi and Mohamad Sawan

AGRION: Reduce Chemical Uses in Agriculture to Preserve Environment and Human Health

*Luca Nari, Francesca Costamagna, Graziano Vittone
Agrion, Italy*

Smart Needle for Fat Profile Detection in Meat

Javier Ramos{1}, Jose L. Ausín{2}, Diego Lozano{1}, Guido Torelli{3}, Francisco Duque-Carillo{2}{1}BioBee Technologies, Spain; {2}Universidad de Extremadura, Spain; {3}Università degli Studi di Pavia, Italy

MIAMI - Mobile Wireless Instrument LOC-Based to Identify and Measure M1 Aflatoxin in the Milk Chain

*Umberto Bena, Sergio Blengini
Informatica Sistemi, Italy*

Precision Agriculture: Challenges in Sensors and Electronics for Real-Time Soil and Plant Monitoring

*Marios Sophocleous, Julius Georgiou
University of Cyprus, Cyprus*

EXPO-AGRI: Smart Automatic Greenhouse Control

*Alberto Castellini^{3}, Alessandro Farinelli^{3}, Giovanni Minuto^{2}, Davide Quaglia^{3}, Iseo Secco^{1},
Federico Tinivella^{2}
^{1}Agricontrol snc, Italy; ^{2}CERSAA, Italy; ^{3}Università degli Studi di Verona, Italy*

A Feasibility Study for Food Contamination Monitoring via Microwave Imaging Technology

*Jorge A. Tobon Vasquez^{2}, Giovanna Turvani^{2}, Gianluca Dassano^{2}, Marco Vacca^{2}, Mario R. Casu^{2}, Rosa Scapaticci^{1}, Francesco Savorani^{2}, Francesca Vipiana^{2}
^{1}Consiglio Nazionale delle Ricerche, Italy; ^{2}Politecnico di Torino, Italy*

Internet of Things as a Means to Improve Agricultural Sustainability

*Giovanni Colucci, Mattia Poletti, Riccardo Stefanelli, Daniele Trincherò
Politecnico di Torino, Italy*

16:15 – 16:45

BREAK

16:45

DISCUSSION PANEL: Does agriculture (plants, foods, etc...) need more hightech interventions? Which ones?

18:45 – 24:00

GALA DINNER

Location: la Venaria Reale

BioCAS 2017 - SATURDAY, OCTOBER 21st

8:30 - 10:00

LECTURE SESSION: SPECIAL SESSION: Next Generation Millimeter-Scale Wireless Neural Implants

Room: Aula Magna

Session Chairs: Timothy Constandinou and Maysam Ghovanloo

Scaling of Ultrasound-Powered Receivers for Sub-Millimeter Wireless Implants

*Ting Chia Chang, Marcus Weber, Jayant Charthad, Spyridon Baltsavias, Amin Arbabian
Stanford University, United States*

Millimeter-Scale Integrated and Wirewound Coils for Powering Implantable Neural Microsystems

*Peilong Feng^{2}, Timothy Constandinou^{2}, Pyungwoo Yeon^{1}, Maysam Ghovanloo^{1}
^{1}Georgia Institute of Technology, United States; ^{2}Imperial College London, United Kingdom*

Microwire-CMOS Integration of mm-Scale Neural Probes for Chronic Local Field Potential Recording

*Katarzyna Szostak, Federico Mazza, Michal Maslik, Lieuwe Leene, Peilong Feng, Timothy Constandinou
Imperial College London, United Kingdom*

Wireless Powering of mm-Scale Fully-on-Chip Neural Interfaces

*Jiwoong Park^{2}, Chul Kim^{2}, Abraham Akinin^{2}, Sohmyung Ha^{1}, Gert Cauwenberghs^{2}, Patrick Mercier^{2}
^{1}NYU Abu Dhabi, U.A.E.; ^{2}University of California, San Diego, United States*

A Miniature Headstage for High Resolution Closed-Loop Optogenetics

*Adam Mendrela^{2}, Kanghwan Kim^{2}, Daniel English^{1}, Sam McKenzie^{1}, John Seymour^{2}, György Buzsáki^{1}, Euisik Yoon^{2}
^{1}New York University, United States; ^{2}University of Michigan, United States*

10:00 - 11:00

COFFEE BREAK

Room: Sala Consiglio di Facoltà

10:00 - 11:00

POSTER SESSION: SPECIAL SESSION: BrainCAS, Neural Implants + Implantable Electronics & Interfaces

Room: Sala Consiglio di Facoltà

Session Chairs: Timothy Constandinou and Maysam Ghovanloo

7016

Spike Context: a Neuromorphic Descriptor for Pattern Recognition

*Bharath Ramesh, Ngoc Anh Le Thi, Garrick Orchard, Cheng Xiang
National University of Singapore, Singapore*

7021

A 216 nW/Channel DSP Engine for Triggering Theta Phase-Locked Brain Stimulation

Ahmed Alzuhair, Dejan Marković

University of California, Los Angeles, United States

7024

A Simultaneous Neural Recording and Stimulation System Using Signal Folding in Recording Circuits

Yi Chen{4}, Arindam Basu{4}, Xu Liu{1}, Lei Yao{6}, Sudip Nag{5}, Minkyu Je{3}, Nitish Vyomesh Thakor{2}

{1}Beijing University of Technology, China; {2}Johns Hopkins University / National University of Singapore, Singapore; {3}Korea Advanced Institute of Science and Technology, Korea; {4}Nanyang Technological University, Singapore; {5}National University of

7044

Electronics for a Safe Direct Current Stimulator

Patrick Ou, Gene Fridman

Johns Hopkins University, United States

7054

A 0.6 V 10 Bit 120 kS/s SAR ADC for Implantable Multichannel Neural Recording

Xingyuan Tong, Ronghua Wang

Xi'an University of Posts and Telecommunications, China

7086

A True Full-Duplex 32-Channel 0.135cm³ Neural Interface

Dejan Rozgić, Vahagn Hokhikyan, Wenlong Jiang, Sina Basir-Kazeruni, Hariprasad Chandrakumar, Weiyu Leng, Dejan Marković

University of California, Los Angeles, United States

7142

Miniature Elastomeric Valve Design for Safe Direct Current Stimulator

Chaojun Cheng, Raviraj Thakur, Ankitha Rajagopalan Nair, Scott Sterrett, Gene Fridman

Johns Hopkins University, United States

7146

Continuous Active Probing and Modulation of Neural Networks with a Wireless Implantable System

Vaclav Kremen{1}, Benjamin Brinkmann{1}, Inyong Kim{1}, Su-Youne Chang{1}, Jamie Van Gompel{1}, Jeffrey Herron{2}, Steven Baldassano{4}, Edward Patterson{3}, Brian Litt{4}, Timothy Denison{2}, Gregory Worrell{1}

{1}Mayo Clinic, United States; {2}Medtronic, United States; {3}University of Minnesota College of Veterinary Medicine, United States; {4}University of Pennsylvania, United States

7196

A Neural Data Lossless Compression Scheme Based on Spatial and Temporal Prediction

Matteo Pagin, Maurits Ortmanns

Universität Ulm, Germany

- 7222**
Event-Based Delay-Controlled Stimulator Controller with Priority Queue for Real-Time Closed-Loop Neural Interface System
Jongkil Park, Yong Hee Kim, Sang-Don Jung
Electronics and Telecommunications Research Institute, Korea
- 7223**
Emotion Recognition Based on Low-Cost in-Ear EEG
Gang Li, Zhe Zhang, Guoxing Wang
Shanghai Jiao Tong University, China
- 7270**
Minimally Invasive Intracranial Pressure Monitoring: an Epidural Approach with a Piezoresistive Probe
Jonathan Garich, Nicholas Fritz, Dixie Kullman, Jesse Munoz, Jennifer Blain Christen
Arizona State University, United States
- 7153**
Targeted Transcutaneous Electrical Nerve Stimulation for Phantom Limb Sensory Feedback
Luke Osborn^{2}, Matthew Fifer^{4}, Courtney Moran^{4}, Joseph Betthausen^{2}, Robert Armiger^{4}, Rahul Kaliki^{1}, Nitish Vyomesh Thakor^{3}
^{1}Infinite Biomedical Technologies / Johns Hopkins University, United States; ^{2}Johns Hopkins University, United States; ^{3}Johns Hopkins University / National University of Singapore, United States; ^{4}Johns Hopkins University Applied Physics Laboratory
- 7134**
Electrode-Shift Tolerant Myoelectric Movement-Pattern Classification Using Extreme Learning for Adaptive Sparse Representations
Joseph Betthausen^{2}, Luke Osborn^{2}, Rahul Kaliki^{1}, Nitish Vyomesh Thakor^{3}
^{1}Infinite Biomedical Technologies / Johns Hopkins University, United States; ^{2}Johns Hopkins University, United States; ^{3}Johns Hopkins University / National University of Singapore, United States
- 7045**
Adaptive Closed-Loop Bladder Neuromodulation
Yen Xian Wendy Peh^{2}, Marlena Natalia Raczkowska^{2}, Yuni Teh^{2}, Monzurul Alam^{3}, Nitish Vyomesh Thakor^{1}, Shih-Cheng Yen^{2}
^{1}Johns Hopkins University / National University of Singapore, United States; ^{2}National University of Singapore, Singapore; ^{3}National University of Singapore / Hong Kong Polytechnic University, Singapore
- 7090**
An Implant for Wireless in Situ Measurement of Lip Pressure with 12 Sensors
Joachim Becker, David Pellhammer, Patrick Preißner, Julia Glöggler, Bernd Lapatki, Maurits Ortmanns
Universität Ulm, Germany
- 7173**
Fluorescence Imaging Device with an Ultra-Thin Micro-LED
Kiyotaka Sasagawa, Makito Haruta, Koki Fujimoto, Yasumi Ohta, Toshihiko Noda, Takashi Tokuda, Jun Ohta
Nara Institute of Science and Technology, Japan

7188

Implantable Mics-Based Wireless Solution for Bladder Pressure Monitoring

Antoine Tantin{1}, Antoine Letourneau{1}, Mohamed Zgaren{1}, Sami Hached{1}, Ingelin Clausen{2}, Mohamad Sawan{1}

{1}Polytechnique Montreal, Canada; {2}SINTEF Digital, Norway

7195

Ultra-Thin Biocompatible Implantable Chip for Bidirectional Communication with Peripheral Nerves

Maaïke Op de Beeck{4}, Rik Verplancke{3}, David Schaubroeck{3}, Dieter Cuypers{3}, Maarten Cauwe{3}, Bjorn Vandecasteele{3}, John O'Callaghan{1}, Dries Braeken{1}, Alexandru Andrei{1}, Andrea Firrincieli{1}, Marco Ballini{1}, Aritra Kundu{2}, Ahmed Fahmy{

{1}IMEC, Belgium; {2}University of Florida, United States; {3}University of Gent, Belgium; {4}University of Gent / IMEC, Belgium

7205

LED-Based Temperature Sensor

Fahimeh Dehkhoda, Ahmed Soltan, Nikhil Ponon, Anthony O'Neill, Patrick Degenaar
Newcastle University, United Kingdom

7225

Adaptive Power Regulation and Data Delivery for Multi-Module Implants

Andrea Mifsud, Dorian Hacı, Sara Ghoreishizadeh, Yan Liu, Timothy Constandinou
Imperial College London, United Kingdom

7281

An Active Charge Balancing Method Based on Anodic Current Variation Monitoring

Reza Ranjandish, Alexandre Schmid
École Polytechnique Fédérale de Lausanne, Switzerland

11:00 – 12:00

KEYNOTE 3: Georges Gielen

Room: Aula Magna

12:00 – 12:45

LUNCH

Room: Sala Consiglio di Facoltà

12:45 - 14:15

LECTURE SESSION: Implantable Electronics

Room: Aula Magna

Session Chairs: Nitish Thakor and Fathi M Salem

Wireless Intracranial Pressure Monitoring System Based on an Air Pressure Sensor

Zeliang Wu{2}, Hanjun Jiang{2}, Yanshu Guo{2}, Chun Zhang{2}, Wen Jia{1}, Zhihua Wang{2}

{1}Research Institute of Tsinghua University in Shenzhen, Guangdong, China, China; {2}Tsinghua University, China

Towards an Implantable Telemetry System for SpO₂ and PWV Measurement in Small Animals

*Philipp Schönle{2}, Qing Wang{1}, Noé Brun{2}, Jonathan Bösser{2}, Pascale Meier{2}, Qiuting Huang{2}
{1}CHUV Lausanne, Switzerland; {2}Eidgenössische Technische Hochschule Zürich, Switzerland*

Fabrication and in Vivo Demonstration of Microchip-Embedded Smart Electrode Device for Neural Stimulation in Retinal Prosthesis

*Toshihiko Noda{1}, Shinya Nishimura{1}, Yukari Nakano{2}, Yasuo Terasawa{2}, Makito Haruta{1},
Kiyotaka Sasagawa{1}, Takashi Tokuda{1}, Jun Ohta{1}
{1}Nara Institute of Science and Technology, Japan; {2}NIDEK Co., Ltd., Japan*

Measurement of Energy Transmission Efficiency of Transcutaneous Energy Transformer in NaCl Solution for Ventricular Assist Devices by Reducing Common-Mode Current in the Range of 200-1500 kHz

*Tadashi Kaga, Kenji Shiba
Tokyo University of Science, Japan*

Microfabrication, Assembly, and Hermetic Packaging of mm-Sized Free-Floating Neural Probes

*Pyungwoo Yeon, Joe Gonzalez, Muneeb Zia, Sreejith Kochupurackal Rajan, Gary May, Muhannad Bakir,
Maysam Ghovanloo
Georgia Institute of Technology, United States*

14:15 – 15:45

LECTURE SESSION: SPECIAL SESSION: Body Dust

Room: Aula Magna

Session Chairs: Pantelis Georgiou and Sandro Carrara

CMOS Body Dust - Towards Drinkable Diagnostics

*Jan Snoeijs{1}, Pantelis Georgiou{2}, Sandro Carrara{1}
{1}École Polytechnique Fédérale de Lausanne, Switzerland; {2}Imperial College London, United Kingdom*

Acquisition of Bioelectrical Signals with Small Electrodes

*Vijay Viswam, Marie Obien, Urs Frey, Felix Franke, Andreas Hierlemann
Eidgenössische Technische Hochschule Zürich, Switzerland*

Compact Model for Flexible Ion-Sensitive Field-Effect Transistor

*Anastasios Vilouras, Ravinder Dahiya
University of Glasgow, United Kingdom*

Low-Power Architecture for Integrated CMOS Bio-Sensing

*Paolo Motto Ros{1}, Beatrice Miccoli{2}, Alessandro Sanginario{2}, Danilo Demarchi{2}
{1}Istituto Italiano di Tecnologia, Italy; {2}Politecnico di Torino, Italy*

Coil Array Design for Maximizing Wireless Power Transfer to Sub-mm Sized Implantable Devices

*Yasha Karimi{2}, Adam Khalifa{1}, Webert Montlouis{1}, Milutin Stanačević{2}, Ralph Etienne-
Cummings{1}
{1}Johns Hopkins University, United States; {2}Stony Brook University, United States*

15:45 – 16:30

COFFEE BREAK

Room: Sala Consiglio di Facoltà

15:45 – 16:30

POSTER SESSION: Smart Devices, Circuits, and Systems

Room: Sala Consiglio di Facoltà

Session Chairs: Guoxing Wang and Kea-Tiong Samuel Tang

7287

Recombinase-Based Genetic Circuit Optimization

Chun-Ning Lai^{2}, Jie-Hong Jiang^{2}, Francois Fages^{1}

^{1}Inria Paris-Rocquencourt, France; ^{2}National Taiwan University, Taiwan

7147

A Novel Multiplier Design for Data Rendering

Muhammad Saleh Rashid, Ali Muhtaroglu

Middle East Technical University, Turkey

7158

An Automated Tracking System for Y-Maze Behavioral Test Using Kinect Depth Imaging

Zheyuan Wang^{1}, Kevin Murnane^{2}, Maysam Ghovanloo^{1}

^{1}Georgia Institute of Technology, United States; ^{2}Mercer University, United States

7186

Acoustic Analog Front-End for Bragg-Peak Detection in Hadron Therapy

Michele Riva, Elia Arturo Vallicelli, Andrea Baschirotto, Marcello De Matteis

Università degli Studi di Milano-Bicocca, Italy

7210

Development of a Two-Tap Time-Resolved CMOS Lock-in Pixel Image Sensor with High Charge Storability and Low Temporal Noise

Min-Woong Seo, Shoji Kawahito

Shizuoka University, Japan

7010

A 0.21 μ J Patient-Specific REM/Non-REM Sleep Classifier for Alzheimer Patients

Muhammad Awais Bin Altaf, Wala Saadeh

Lahore University of Management Sciences, Pakistan

7050

A 1 V 10 Bit 25 kS/s VCO-Based ADC for Implantable Neural Recording

Xingyuan Tong, Jie Wang

Xi'an University of Posts and Telecommunications, China

7041

Impedance-Based Detection of Schistosoma mansoni Larvae Viability for Drug Screening

Mario Matteo Modena^{1}, Ketki Chawla^{1}, Flavio Lombardo^{2}, Sebastian Bürgel^{1}, Gordana Panic^{2}, Jennifer Keiser^{2}, Andreas Hierlemann^{1}

^{1}Eidgenössische Technische Hochschule Zürich, Switzerland; ^{2}University Basel, Switzerland

- 7116**
Entrapment of Microparticles in a Microfluidic Device: a Model for Isolation of Circulating Tumor Cells
ádám György Szélig{1}, Csilla Kurdi{2}, Márton Hartdében{1}, Kristóf Iván{1}, Tamás Kőszegi{2}, András József Laki{1}
{1}Pázmány Péter Catholic University, Hungary; {2}University of Pécs, Hungary
- 7066**
Modeling Biochemical Reactions and Gene Networks with Memristors
Hanna Abo Hanna, Loai Danial, Shahar Kvatinsky, Ramez Daniel
Technion, Israel
- 7080**
Algorithm and Hardware Design of Discrete-Time Spiking Neural Networks Based on Back Propagation with Binary Activations
Shihui Yin{1}, Shreyas K. Venkataramanaiah{1}, Gregory K. Chen{2}, Ram Krishnamurthy{2}, Yu Cao{1}, Chaitali Chakrabarti{1}, Jae-Sun Seo{1}
{1}Arizona State University, United States; {2}Intel Corporation, United States
- 7100**
A Compact Phenomenological Digital Neuron Implementing the 20 Izhikevich Behaviors
Charlotte Frenkel, Jean-Didier Legat, David Bol
ICTEAM Institute, Université catholique de Louvain, Belgium
- 7138**
FPGA-Based Muscle Synergy Extraction for Surface EMG Gesture Classification
Giuseppe Franco, Pierandrea Cancian, Luca Cerina, Elisabetta Besana, Noemi Beretta, Marco Domenico Santambrogio
Politecnico di Milano, Italy
- 7199**
An Energy Efficient Neuromorphic Computing System Using Real Time Sensing Method
Hooman Farkhani{1}, Mohammad Tohid{1}, Sadaf Farkhani{2}, Jens Kargaard Madsen{1}, Farshad Moradi{1}
{1}Aarhus university, Denmark; {2}Islamic Azad University, Najafabad branch, Iran
- 7233**
A Compact Ultra Low-Power Pulse Delay and Extension Circuit for Neuromorphic Processors
Carsten Nielsen, Ning Qiao, Giacomo Indiveri
Universität Zürich / Eidgenössische Technische Hochschule Zürich, Switzerland
- 7290**
Neuromorphic Synapses with Reconfigurable Voltage-Gated Dynamics for Biohybrid Neural Circuits
Jun Wang{2}, Theodore Yu{1}, Abraham Akinin{2}, Gert Cauwenberghs{2}, Frederic Broccard{2}
{1}Texas Instruments, United States; {2}University of California, San Diego, United States
- 7031**
Rapid Cervical Cancer Detection Using Neuromorphic Hardware
Manan Suri, Narayani Bhatia, Shridu Verma
Indian Institute of Technology - Delhi, India

7052

Live Wire: Body Channel Communication As a High Impedance and Frequency-Scaled Impulse Radio

*Marco Crepaldi, Giorgio Zini, Antonio Maviglia, Alessandro Barcellona, Andrea Merello, Luca Brayda
Istituto Italiano di Tecnologia, Italy*

7083

An Embedded FPGA Accelerator for a Stand-Alone Dual-Mode Assistive Device

*Ali Jafari{2}, Maysam Ghovanloo{1}, Tinoosh Mohsenin{2}
{1}georgia institute of technology, United States; {2}University of Maryland Baltimore county, United States*

7096

Machine Learning Microserver for Neuromodulation Device Training

*Gerard O'Leary{2}, Asish Abraham{2}, Akshay Kamath{2}, David Groppe{1}, Taufik Valiante{2}, Roman Genov{2}
{1}Krembil Research Institute, Canada; {2}University of Toronto, Canada*

7130

Earnest: a 64 Channel Device for Neural Recording and Sensory Touch Restoration in Neural Prosthetics

*Caterina Carboni, Lorenzo Bisoni, Roberto Puddu, Gianluca Barabino, Danilo Pani, Luigi Raffo, Massimo Barbaro
Università degli studi di Cagliari, Italy*

7143

A Superposition-Based Analog Data Compression Scheme for Massively-Parallel Neural Recordings

*Jonas David Rieseler, Matthias Kuhl
Albert-Ludwigs-Universität Freiburg, Germany*

7208

Wearable Pulse Wave Velocity Sensor Using Flexible Piezoelectric Film Array

*Takumi Katsuura{1}, Shintaro Izumi{1}, Shusuke Yoshimoto{2}, Hiroshi Kawaguchi{1}, Masahiko Yoshimoto{1}, Tsuyoshi Sekitani{2}
{1}Kobe University, Japan; {2}Osaka University, Japan*

7278

Experimental Evaluation of Stimulus Current Generator with Laplacian Edge-Enhancement for 3-D Stacked Retinal Prosthesis Chip

*Kenji Shimokawa{2}, Zhengyang Qian{2}, Yoshiki Takezawa{2}, Hisashi Kino{2}, Takafumi Fukushima{2}, Koji Kiyoyama{1}, Tetsu Tanaka{2}
{1}Nagasaki Institute of Applied Science, Japan; {2}Tohoku University, Japan*

16:30 – 18:00

LECTURE SESSION: Biosensor Interfaces

Room: Aula Magna

Session Chairs: Wouter Serdijn and Sara Ghoreishizadeh

Scalable Hybrid Integration of CMOS Circuits and Fluidic Networks for Biosensor Applications

*McKay Lindsay^{2}, Shaan Sengupta^{2}, Kevin Bishop^{2}, Megan Co^{2}, Chien-Hua Chen^{1}, Michael Cumbie^{1}, Matthew Johnston^{2}
^{1}HP, Inc., United States; ^{2}Oregon State University, United States*

A Fully-Integrated Circulating Tumor Cell Analyzer Using an on-Chip Vector Network Analyzer and a Transmission-Line-Based Detection Window in 65-nm CMOS

*Taiki Nakanishi^{1}, Maya Matsunaga^{1}, Atsuki Kobayashi^{1}, Kazuo Nakazato^{1}, Kiichi Niitsu^{2}
^{1}Nagoya University, Japan; ^{2}Nagoya University / Japan Science And Technology Agency, Japan*

A 65nm Compressive-Sensing Time-Based ADC with Embedded Classification and INL-Aware Training for Arrhythmia Detection

*Anvesha Amaravati, Kyle Xu, Justin Romberg, Arijit Raychowdhury
GEORGIA TECH, United States*

A Wireless System for Continuous in-Mouth pH Monitoring

*Daryl Ma^{1}, Christine Mason^{2}, Sara Ghoreishizadeh^{1}
^{1}Imperial College London, United Kingdom; ^{2}St Johns Smiles, United States*

A Patch-Type Wireless Forehead Pulse Oximeter for SpO₂ Measurement

*Afreen Azhari^{2}, Shusuke Yoshimoto^{2}, Toshikazu Nezu^{2}, Hirokazu Iida^{2}, Hiroki Ota^{2}, Yuki Noda^{2}, Teppei Araki^{2}, Takafumi Uemura^{2}, Tsuyoshi Sekitani^{2}, Katsuyuki Morii^{1}
^{1}Nippon Shokubai Co., LTD, Japan; ^{2}Osaka University, Japan*

18:00 – 19:00

Guided Walk to FAREWELL EVENT

Walk under the Arcades

19:00 – 21:00

FAREWELL EVENT

Palazzo Madama

BioCAS 2018

Biomedical Circuits and Systems Conference

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IMPORTANT DATES

Monday, April 23, 2018

Special Session Proposal Deadline

Monday, June 11, 2018

Regular Paper Submission Deadline

Monday, July 16, 2018

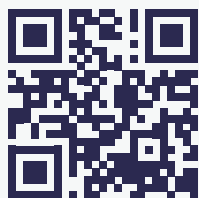
Live Demo Submission Deadline

Monday, August 13, 2018

Author Notification Date

Friday, August 31, 2018

Author Registration/Final Paper
Submission Deadline



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- Bio-Inspired and Neuromorphic Circuits and Systems
- Biosensor Devices and Interface Circuits
- Biotelemetry and Energy Harvesting/Scavenging Circuits and Systems
- Body Area/Sensor Network and Wireless/Wearable Health Monitoring
- Electronics for Neuroscience
- Implantable Medical Electronics
- Lab-on-Chip and BioMEMS
- Point-of-Care Technologies for Healthcare

Biomedical Applications

- Biomedical Imaging and Image Processing
- Biosignal Recording, Processing, and Machine Learning
- Genomics and Systems Biology
- Human-Machine Interfaces
- Medical Information Systems and Bioinformatics

Submission Guidelines

The complete 4-page paper (in standard IEEE double-column format), including the title, authors' names, affiliations and e-mail addresses, as well as a short abstract and an optional demonstration video link (3 minute max) are requested. Papers must be submitted electronically in PDF format through www.biocas2018.org.

Confirmed Keynote Speakers

Michael Roukes, Ph.D.

Robert M. Abbey Professor of
Physics, Applied Physics, and
Biological Engineering
California Institute of Technology,
USA

Andrew DeHennis, Ph.D.

Director, Engineering, R&D
Senseonics, Inc., USA

