

Auspices:



*Fondazione
Cassa di Risparmio di Puglia*



5th IEEE International Workshop on Advances in Sensors and Interfaces



**13-14 June 2013
Villa Romanazzi Carducci
Bari, Italy**



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June 13, 2013

08.30 Registration

09.00 Welcome addresses

N. Costantino, Chancellor of Politecnico of Bari, Italy

N. Vendola, President of Apulia Region

M. Emiliano, Mayor of Bari

M. de Palma, Director INFN Bari, Italy

D. De Venuto, Workshop Chair

09.15 Opening Speeches

Jan M. Rabaey (Donald O. Pederson Distinguished Professor,
Dept. of EECS University of California at Berkeley, CA, USA)

The Innovation is in the Minds

10.00 **Enrico Macii** (Politecnico di Torino - Italy)

**Enable Sensor Networks Interoperability in Smart Public
Spaces through a Service Oriented Approach**

10.30 *Coffee break and Poster Exhibition*

Session I

Ambient Assisted Living and Smart Health

Chairs: **Pietro Siciliano** (IMM-CNR Lecce-Italy) and
Daniela De Venuto (Politecnico di Bari-Italy)

11.00 *Invited Speaker:* **C. Van Hoof** (IMEC, Belgium)

**Addressing the Healthcare Cost Dilemma by Managing
Health instead of Managing Illness. An opportunity for
Wireless Wearable Sensors**

11.30 **Remotely Powered Implantable Heart Monitoring System
for Freely Moving Animals**

Enver Gurhan Kilinc, Catherine Dehollain, Alejandro C. Moya, Harald V. Lintel,
Philippe Renaud, Qing Wang, Franco Maloberti

*EPFL - Lausanne - Switzerland, CHUV - Switzerland, Università degli Studi di
Pavia - Italy*

11.45 **Mobile and Wireless Inertial Sensor Platform for Motion
Capturing in Stroke Rehabilitation Sessions**

Hans-Peter Brückner, Rochus Nowosielski, Henning Kluge and Holger Blume
Leibniz Universität Hannover - Germany

12.00 **Accelerometer Based Intelligent System for Human
Movement Recognition**

Fernando Ginez da Silva and Elisabete Galeazzo

Escola Politécnica da Universidade de São Paulo - Brazil



12.15 **Support Vector Machine for Tri-axial Accelerometer-based Fall Detector**

Gabriele Rescio, Alessandro Leone and Pietro Siciliano
CNR-IMM - Lecce - Italy

(P) **Food Intake Monitoring System for Mobile Devices**

Engin Mendi, Ocal Ozyavuz, Emrah Pekeseny and Coskun Bayrak
KTO Karatay University, Konya - Turkey, Istanbul Kultur University - Turkey

Session II
CMOS solutions for bio-interface

Chair: **Michel Declercq** (EPFL Lausanne-Switzerland)

12.30 *Invited Speaker:* **A. Poon** (Stanford University - USA)
Emerging wireless applications in biomedicine

13.00 **Empirical Study of Noise Dependence in Electrochemical Sensors**

Sara Ghoreishizadeh, Gaurav Nanda, Sandro Carrara and Giovanni De Micheli
EPFL - Lausanne - Switzerland

13.15 *Lunch*

Session II
CMOS solutions for bio-interface

Chair: **Michel Declercq** (EPFL Lausanne-Switzerland)

14.15 **On the response of nanoelectrode capacitive biosensors to DNA and PNA strands**

Federico Pittino, Federico Passerini, Luca Selmi, Pierpaolo Palestri and Frans Widdershoven
DIEGM - Università degli Studi di Udine - Italy
NXP Semiconductors - Leuven - Belgium

14.30 **Capacitive Detuning Optimization for Wireless Uplink Communication in Neural Implants**

Gurkan Yilmaz and Catherine Dehollain
EPFL - Lausanne - Switzerland

14.45 **A Wireless Address-Event Representation System for ATC-Based Multi-Channel Force Wireless Transmission**

Paolo Motto Ros, Marco Paleari, Nicolò Celadon, Alessandro Sanginario, Alberto Bonanno, Marco Crepaldi, Paolo Ariano and Danilo Demarchi
Istituto Italiano di Tecnologia @Polito - Italy, Fondazione Istituto Italiano di Tecnologia - Italy, Politecnico di Torino - Italy



Session III

Innovative radiation detectors for particle and nuclear physics

Chair: **Eugenio Nappi** (INFN Bari-Italy)

15.00 *Invited Speaker:* **A. Di Ciaccio** (Università Roma Tor Vergata and INFN Italy)

The Higgs Boson discovery and the role of detector technology

15.30 **Novel architectures of MPGD based detectors of single photons**

Stefano Levorato

INFN Trieste and Trieste University - Italy

15.45 **A CMOS 0.13 μ m Read-out Front-End for Triple-Gas-Electron-Multiplier Detectors**

Alessandro Pezzotta, Marcello De Matteis, Andrea Costantini,

Andrea Baschirotto, Giuseppe Gorini, Marco De Blasi, Fabrizio Murtas

University of Milano-Bicocca - Italy, University of Salento - Lecce - Italy

Laboratori Nazionali di Frascati INFN - Italy

16.00 **A ReadOut Electronics for Drift Chambers Signals Processing**

Michele Cascella, Marco Panareo, Alessandro Corvaglia, Francesco Grancagnolo,

Aurora Pepino, Patrizio Primiceri, Giovanni Tassielli and Yury Yudin

University of Salento and INFN - Italy, University of Rome "G. Marconi" and

INFN - Italy, Budker Institute of Nuclear Physics - Russian Federation

16.15 **Characterization Of An SRAM Based Particle Detector For Mixed-Field Radiation Environments**

Georgios Tsiligiannis, Luigi Dilillo, Alberto Bosio, Patrick Girard,

Serge Pravossoudovitch, Aida Todri-Sanial, Arnaud Virazel, Julien Mekki,

Markus Brugger, Jean-Roch Vaillé, Frédéric Wrobel and Frédéric Sagne

LIRMM - Montpellier - France, CERN - Geneva - Switzerland, IES - Montpellier

France

(P) **An innovative polyimide microchannels cooling system for the pixel sensor of the upgraded ALICE inner tracker**

Gabriele Fiorenza, Vito Manzari, Cosimo Pastore, Irene Sgura,

Corrado Gargiulo

INFN Bari - Italy, Conseil Européenne pour la Recherche

Nucléaire, Geneva - Switzerland



Session IV

Sensors and sensor interfaces based on organic and large area electronics

Chair: **Eugenio Cantatore** (Eindhoven Univ. of Technology - The Netherlands)

16.30 *Invited Speaker:* **H. Fuketa** (University of Tokio and JST/ERATO Tokio - Japan)

Large-Area and Flexible Sensors with Organic Transistors

17.00 **Comparison between different architectures of an electrolyte-gated Organic Thin-Film Transistor fabricated on flexible Kapton substrates**

Liviu Mihai Dumitru, Kyriaki Manoli, Maria Magliulo and Luisa Torsi
University of Bari "Aldo Moro" - Italy

17.15 **Large area printed temperature sensors on flexible substrate**

Abdelkader Aliane, Vincent Fischer, Romain Coppard, Tiphaine Card and Isabelle Chartier
CEA/LITEN/DTNM - Grenoble - France

17.30 **A Discrete-Time Amplifier Based on Thin-Film Trans-Capacitors for Organic Sensor Frontends**

Daniele Raiteri, Arthur van Roermund and Eugenio Cantatore
Eindhoven University of Technology, MSM - Eindhoven - The Netherlands

17.45 **Electrowetting-on-dielectric system based on polydimethylsiloxane**

Domenico Caputo, Giampiero de Cesare, Nicola Lovecchio, Riccardo Scipinotti and Augusto Nascetti
Università "La Sapienza" - Roma - Italy

(P) **Thin film technology flexible thermoelectric generator and dedicated ASIC for energy harvesting applications**

Luca Francioso, Chiara De Pascali, Pietro Siciliano, Arturo De Risi, Stefano D'Amico, Carlo Veri and Mirko Pasca
CNR - Istituto per la Microelettronica e Microsistemi - Lecce - Italy, University of Salento - Lecce - Italy

(P) **Use of butyl-methylimidazolium based ionic liquids with different anions in electrolyte-gated organic field-effect transistors**

Donato De Tullio, Maria Magliulo, Giuseppe Colafemmina, Kyriaki Manoli, Luisa Torsi and Gerardo Palazzo
University of Bari "Aldo Moro" - Italy

20.30 Guided Tour of Trani and Social Dinner



June 14, 2013

09.00 Opening Speech

Luca Benini (Università di Bologna – Italy)

Designing next-generation smart sensor hubs for the Internet-of-Things

Session V

CMOS smart sensors and sensor interfaces

Chair: **Kofi Makinwa** (Delft University of Technology - The Netherlands)

09.30 *Invited Speaker:* **R. van Veldhoven** (NXP Semiconductors, Eindhoven - The Netherlands)

Sensors for Automotive Applications: Challenges and Solutions

10.00 **A $\pm 5A$ Battery Current Sensor with $\pm 0.04\%$ Gain Error from $-55^{\circ}C$ to $+125^{\circ}C$**

Saleh Heidary Shalmany, Kofi Makinwa and Dieter Draxelmayr
Delft University of Technology - The Netherlands, Infineon Technologies - Villach - Austria

10.15 **A New Single-Chip Analog Lock-In Amplifier with Automatic Phase and Frequency Tuning for Physical/Chemical Noisy Phenomena Detection**

Andrea De Marcellis, Giuseppe Ferri, Paolo Mantenuto and Arnaldo D'Amico
University of L'Aquila - Italy, University of Roma Tor Vergata - Italy

10.30 **A Low-Power Read-Out Circuit and Low-Cost Assembly of Nanosensors onto a $0.13 \mu m$ CMOS Micro-for-Nano Chip**

Alberto Bonanno, Valentina Cauda, Marco Crepaldi, Paolo Motto Ros, Marco Morello, Daniilo Demarchi and Pierluigi Civera
Istituto Italiano di Tecnologia @Polito, CSHR - Torino - Italy, Politecnico di Torino - Italy

10.45 **On-chip Mass Sensing at the Physical Limits of Nanoelectromechanical Systems**

Christian Kauth, Marc Pastre and Maher Kayal
Ecole Polytechnique Fédérale de Lausanne - Switzerland

(P) **Predictive calibration technique for magnetic field position sensors**

Jose Luis Merino Panades and Catherine Dehollain
Ecole Polytechnique Fédérale de Lausanne - Switzerland



(P) **Electronic interface for position sensing using resonant cavities**

Estibaliz Asua, Alfredo García-Arribas, Victor Etxebarria, Jorge Feutchwanger, Joaquin Portilla and Julio Lucas
UPV/EHU - Bilbao - Spain, Elytt Energy - Madrid - Spain

(P) **Wireless Powering and Data Communication for Neural Implantable Electrodes**

Daniela De Venuto and Jan Rabaey
Politecnico di Bari - Italy, EECS University of California at Berkeley, CA - USA

(P) **CMOS-MEMS technology with front-end surface etching of sacrificial SiO₂ dedicated for acoustic devices**

Josué Esteves, Libor Rufer, Skandar Basrour and Didace Ekeom
TIMA - Grenoble - France, Microsonics - Saint-Avertin - France

11.00 *Coffee break and Poster Exhibition*

Session VI
Sensors in industrial applications and testing

Chair: **Linda S. Milor** (Georgia Institute of Technology-USA)

11.30 *Invited Speaker: G. Gielen* (Katholieke Universiteit Leuven - Belgium)

Timing-based integrated sensor interfaces: hype or promise?

12.00 **A Novel Electrochemical Method for Olive Oil Acidity Determination**

Marco Grossi, Giuseppe Di Lecce, Tullia Gallina Toschi and Bruno Riccò
DEI - University of Bologna - Italy, DISTAL - University of Bologna - Italy

12.15 **New Low-Cost Concept for Characterization of MEMS Accelerometers at Medium-g Levels for Automotive**

Edoardo Giomi, Luca Fanucci and Alessandro Rocchi
University of Pisa - Italy, SensorDynamics AG - Navacchio (Pisa) - Italy

12.30 **BIST of interconnection lines in the pixel matrix of CMOS imagers**

Richun Fei, Jocelyn Moreau and Salvador Mir
STMicroelectronics - Grenoble - France, TIMA Laboratory - Grenoble - France

12.45 **System-Level Modeling and Reliability Analysis of Microprocessor Systems**

Chang-Chih Chen and Linda Milor
Georgia Institute of Technology - Atlanta - USA



13.00 **Spray deposited carbon nanotubes for organic vapour sensors**

Giuseppe De Pascali, Roberto Nasi, Antonio Valentini, Maria Angela Nitti, Giuseppe Casamassima, Marco Valentini and Domenico Melisi
University of Bari "A. Moro" - Italy, INFN Bari - Italy

13.15 *Lunch*

Session VII
Advanced power management for sensor clouds

Chairs: **Luca Benini/Michele Magno** (Università di Bologna – Italy)

14.15 *Invited Speaker:* **E. Popovici** (University College Cork - Ireland)
Power Management Techniques for Wireless Sensor Networks: A Review

14.45 **Clocks, Latency and Energy Efficiency in Duty Cycled, Multi-Hop Wireless Sensor Networks**

Eoin O'Connell, Brendan O'Flynn and David Boyle
Tyndall National Institute - University College Cork - Ireland, Imperial College London - UK

15.00 **Clamp-and-Measure forever: A MOSFET-based circuit for energy harvesting and measurement targeted for power meters**

Danilo Porcarelli, Luca Benini and Davide Brunelli
University of Bologna - Italy, University of Trento - Italy

15.15 **Analyzing the Transient Response of MOX Gas Sensors to Improve the Lifetime of Distributed Sensing Systems**

Maurizio Rossi and Davide Brunelli
University of Trento - Italy

(P) **A versatile biomedical wireless sensor node with novel drysurface sensors and energy efficient power management**

Michele Magno, Luca Benini, Lorenzo Gaggero, Juan Pablo La Torre Aro and Emanuel Popovici
Università di Bologna - Italy, Università di Genova - Italy, University College Cork - Ireland



Session VIII **Swarm of sensors and internet of things**

Chairs: **Eugenio Di Sciascio/Michele Ruta** (Politecnico di Bari-Italy)

- 15.30 *Invited Speaker:* **D. Ranasinghe** (University of Adelaide - Australia)
Automated Activity Recognition and Monitoring of Elderly Using Wireless Sensors: Research Challenges
- 16.00 **Effective Connectivity and Cortical Information Flow Under Visual Stimulation in Migraine with Aura**
Gabriele Trotta, Sebastiano Stramaglia, Mario Pellicoro, Roberto Bellotti, Daniele Marinazzo and Marina De Tommaso
Università degli Studi di Bari "Aldo Moro" - INFN Bari - Italy, Ghent University - Belgium
- 16.15 **Semantic-enhanced resource discovery for CoAP-based sensor networks**
Filippo Gramegna, Saverio Ieva, Giuseppe Loseto and *Agnese Pinto*
Politecnico di Bari - Italy
- 16.30 **Panel Session**
Cyber-Physical planet: dream or nightmare?
- Chair: **Bruno Riccò** (University of Bologna - Italy)
- Antonio Vilei** (STMicroelectronics - Italy)
Robert van Veldhoven (NXP Semiconductors, Eindhoven - The Netherlands)
Franco Bigongiari (SITAEL - Italy)



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