

Welcome Message

MeMeA 2010 is the fifth edition of a successful international workshop series in the field of measurements in medicine and health care, with previous editions held in: Cetraro-Italy (2009), Ottawa-Canada (2008), Warsaw-Poland (2007), and Benevento-Italy (2006).

The workshop deals with all aspects of medical measurements and instrumentation ranging from medical sensor design, physiological signal and image processing, integrated medical measurement systems, ubiquitous and remote medical monitoring, and medical data and clinical decision management. The areas covered by the workshop are set to transform the delivery and management of health care, as new sophisticated technologies are adopted by the health care community at an unprecedented rate.

Medical measurement presents challenges not encountered in other contexts. First, there is the variability between patients that is caused by a multitude of intrinsic and extrinsic factors, some known and some unknown. Second, there is the variability over time, with many physiological signals dramatically changing even on short time scales. Third is the desirability for non-invasive or minimally-invasive measurement, often a highly constraining requirement. Fourth is the strict need for high reliability, a requirement that is not always met by current technologies. And as if these challenges were not enough, the developer of medical measurement systems has to keep in mind cost-conscious governments, fussy clinicians, and very demanding regulatory agencies.

The contributions selected for presentation in this workshop showcase innovative solutions that promise to address some of the challenges in medical measurement. After a rigorous reviewing process, 36 manuscripts presenting contributions of high quality have been selected for publication. The selected contributions come from universities, medical research centers, and government research institutes in North and South America, Europe, and Asia. Given the diverse areas of expertise of the workshop participants, we look forward to hearing critical opinions and participating in stimulating discussions.

A special thank you goes to all of the Technical Program Committee members and the reviewers who have contributed to make this outstanding program possible. Last but not least, we would like to thank all the participants and members of the organizing committee for making this fifth edition of MeMeA a great success.

Welcome to MeMeA 2010 in Ottawa, Ontario, Canada!

General Chairs

Voicu Groza - University of Ottawa, Canada
Rafik Goubran, Carleton University, Canada

Technical Program Co-Chairs

Hilmi Dajani, University of Ottawa, Canada
Sergio Rapuano, Università del Sannio, Italy

Organizers

Honorary Chair

Marco Parvis, Politecnico di Torino, Italy

General Chairs

Voicu Groza, University of Ottawa, Canada

Rafik Goubran, Carleton University, Canada

Technical Program Co-Chairs

Sergio Rapuano, Università del Sannio, Italy

Hilmi Dajani, University of Ottawa, Canada

Publications Chairs

Domenico Grimaldi, University of Calabria, Italy

Miodrag Bolic, University of Ottawa, Canada

Steering Committee

Martin Bouchard

Pasquale Daponte

Alessandro Ferrero

Radu Leca

Emil M. Petriu

Sreeraman Rajan

Local Arrangements Chairs

Raed Abdullah

Wahab Almuhtadi

Branislav Djokic

Conference Management

Chris Dyer, Conference Catalysts LLC, USA

Friday, April 30

- 8:30 AM – 9:00 AM** **Registration**
- 9:00 AM – 9:40 AM** **Opening Session**
- 9:40 AM - 10:40 AM** **Medical measurements and systems I**

Session Chair: Giancarlo Fortino, Università della Calabria, Italy

- 9:40** **Optic visualisation of auricular blood vessels**
Eugenijus Kaniusas (Vienna University of Technology, Austria)
Giedrius Varoneckas (Klaipeda University Hospital, Lithuania)
Jozsef Constantin Szeles (University of Vienna, Austria)
- 10:00** **Measuring Hand-Arm Steadiness for Post-Stroke and Parkinson's Disease Patients Using SIERRA Framework**
Mohammed F. Alhamid (University of Ottawa, Canada)
Atif A. Alamri (University of Ottawa, Canada)
Abdulmotaleb El Saddik (University of Ottawa, Canada)
- 10:20** **PPG-based Methods for Non Invasive and Continuous Blood Pressure Measurement: an Overview and Development Issues in Body Sensor Networks**
Giancarlo Fortino (University of Calabria, Italy)
Valerio Giampà (TD Group S.p.A., Italy)

10:40 AM – 11:00 AM **Coffee Break**

11:00 AM - 12:20 PM **Medical measurements and systems II**

Session Chair: Hilmi Dajani, University of Ottawa, Canada

- 11:00** **The Effect of Blood Pressure Variability on the Estimation of the Systolic and Diastolic Pressures**
Karen Soueidan (University of Ottawa, Canada)
Silu Chen (University of Ottawa, Canada)
Hilmi R. Dajani (University of Ottawa, Canada)
Miodrag Bolic (University of Ottawa, Canada)
Voicu Groza (University of Ottawa, Canada)
- 11:20** **Optical method for measurement of respiration rate**
Lorenzo Scalise (Polytechnic University of Marche, Italy)
Paolo Marchionni (Polytechnic University of Marche, Italy)
Ilaria Ercoli (Polytechnic University of Marche, Italy)
- 11:40** **Analysis of Redundant Peaks in LC-MS/MS Datasets**
Robert Peace (Carleton University, Canada)
James Green (Carleton University, Canada)
Jeff Smith (Carleton University, Canada)
Travis D Stewart (Carleton University, Canada)

12:00 A Computer Based Prediction for Diagnosis of Pulmonary Edema
Shabana Urooj (Galgotias College of engineering, India)
Munna Khan (Mewat Engineering College, India)

12:20 PM – 2:00 PM Lunch

2:00 PM - 3:40 PM Systems for context-aware, ubiquitous, and remote medical monitoring

Session Chair: Octavian Postolache, Instituto Superior Técnico, Portugal

2:00 Context-aware smart home monitoring through pressure measurement sequences

Amaya I Arcelus (Carleton University, Canada)
Rafik Goubran (Carleton University, Canada)
Frank Knoefel (Élisabeth Bruyère Research Institute, Canada)
Heidi Sveistrup (University of Ottawa, Canada)
Martin Bilodeau (University of Ottawa, Canada)

2:20 Validation of Pressure Sensors for Physiological Monitoring in Home Environments

Megan Holtzman (Carleton University, Canada)
Daphne Townsend (Carleton University, Canada)
Rafik Goubran (Carleton University, Canada)
Frank Knoefel (Élisabeth Bruyère Research Institute, Canada)

2:40 Mobility Change-of-State Detection Using a Smartphone-based Approach

Gaëtanne Hache (University of Ottawa, Canada)
Edward Lemaire (University of Ottawa, Canada)
Natalie Baddour (University of Ottawa, Canada)

3:00 Microwave FMCW Doppler radar implementation for in-house pervasive health care system

Octavian Postolache (Instituto de Telecomunicações, Portugal)
Pedro Silva Girão (Instituto de Telecomunicações, Portugal)
Rui Neves Madeira (Escola Superior de Tecnologia, Portugal)
Gabriela Postolache (Universidade Atlântica, Portugal)

3:20 Context-aware physiological data acquisition and processing with wireless sensor networks

Marcin Marzencki (Simon Fraser University, Canada)
Benny Hung (Simon Fraser University, Canada)
Philip Lin (Simon Fraser University, Canada)
YiFeng Huang (Simon Fraser University, Canada)
Thomas Cho (Simon Fraser University, Canada)
Yindar Chuo (Simon Fraser University, Canada)
Bozena Kaminska (Simon Fraser University, Canada)

3:40 PM – 4:00 PM Coffee Break

4:00 PM - 5:00 PM Medical data and clinical decision management

Session Chair: Monique Frize, Carleton University, Canada

4:00 Ubiquitous Social Network Stack For e-Health

Md. Abdur Rahman (University of Ottawa, Canada)
Abdulmotaleb El Saddik (University of Ottawa, Canada)
Wail Gueaieb (University of Ottawa, Canada)

- 4:20 Performance Evaluation of Various Storage Formats for Clinical Data Repositories**
 Jeff Gilchrist (Carleton University, Canada)
 Monique Frize (Carleton University, Canada)
 Colleen M. Ennett (Philips Research North America, USA)
 Erika Bariciak (Children's Hospital of Eastern Ontario, Canada)
- 4:40 Suggested Criteria for Successful Deployment of a Clinical Decision Support System (CDSS)**
 Monique Frize (Carleton University, Canada)
 Sabine Weyand (University of Ottawa, Canada)
 Erika Bariciak (Children's Hospital of Eastern Ontario, Canada)
- 5:00 PM – 6:00 PM Meeting of the TC-25 subcommittee on the standardization of blood measurement**

7:00 PM – 10:00 PM Social Dinner

Saturday, May 1

8:20 AM - 10:00 AM Medical sensors and hardware systems I

Session Chair: James Green, Carleton University, Canada

- 8:20 Capacitive Sensing of Interfacial Forces in Prosthesis**
 Kishore Sundara-Rajan (University of Washington, USA)
 Gabriel I. Rowe (University of Washington, USA)
 Aaron Bestick (University of Washington, USA)
 Alexander V. Mamishev (University of Washington, USA)
 Glenn K. Klute (VA Puget Sound Health Care System, USA)
 William R. Ledoux (VA Puget Sound Health Care System, USA)
- 8:40 Surface Electromyographic Signals using a Dry Electrode**
 Pascal Laferriere (Institute for Rehabilitation Research and Development, Canada)
 Adrian D.C. Chan (Carleton University, Canada)
 Edward D. Lemaire (University of Ottawa, Canada)
- 9:00 High-Voltage Pulse Stress on Biomedical Ultrasound Probe Soldered with Ag-ECA**
 Valeria L. Scarano (University of Florence, Italy)
 Marcantonio Caatelani (University of Florence, Italy)
 Francesco Bertocci (University of Florence, Italy)
 Roberto Singuaroli (Universtiy of Florence, Italy)
- 9:20 A Bus-Based Smart Myoelectric Electrode/Amplifier**
 Adam W. Wilson (University of New Brunswick, Canada)
 Yves G. Losier (University of New Brunswick, Canada)
 Philip A. Parker (University of New Brunswick, Canada)
 Dennis F. Lovely (University of New Brunswick, Canada)
- 9:40 Design of a Gel-less Two-Electrode ECG Monitor**
 Emile Richard (Carleton University, Canada)
 Adrian D.C. Chan (Carleton University, Canada)

10:00 AM – 10:20 AM **Coffee Break**

10:20 AM - 11:20 AM **Medical sensors and hardware systems II**

Session Chair: Abed El-Saddik, University of Ottawa, Canada

10:20 **A CMOS Linear Power Supply for a Wireless Biomedical Sensor**

Paulo Crepaldi (Universidade Federal de Itajuba, Brazil)
Tales Pimenta (Universidade Federal de Itajuba, Brazil)
Robson Moreno (Universidade Federal de Itajuba, Brazil)
Edgar Rodriguez (Universidade de São Paulo, Brazil)

10:40 **A Low Cost Bidirectional Human-Computer Interface**

Alexey Borisenko (University of Ottawa, Canada)
Lukash Monczak (University of Ottawa, Canada)
Ovidiu Draghici (University of Ottawa, Canada)
Ikvir S Samra (University of Ottawa, Canada)
Daniel Shapiro (University of Ottawa, Canada)
Voicu Groza (University of Ottawa, Canada)

11:00 **Development of a Performance Calibration System for X-26 Tasers**

David Dawson (Carleton University, Canada)
Yasheng Maimaitijiang (Co-author, Canada)
Andy Adler (Carleton University, Canada)

11:20 AM – 12:20 PM **Medical signal processing and pattern classification I**

Session Chair: Aimé Lay-Ekuakille, University of Salento, Italy

11:20 **Ergospirometric Signal Processing for Human Breath and Force Measurements**

Aime' Lay-Ekuakille (University of Salento, Italy)
Amerigo Trotta (Politechnic of Bari, Italy)
Patrizia Vergallo (University of Salento, Italy)
Antonio Trabacca (Politechnic of Bari, Italy)
Marta De Rinaldis (IRCSS "E. Medea", Italy)
Francesco Angelillo (IRCSS "E. Medea", Italy)
Lucia Petrara (IRCSS "E. Medea", Italy)

11:40 **Effect of Windowing on Central Apnea Detection**

Daphne Townsend (Carleton University, Canada)
Megan Holtzman (Carleton University, Canada)
Rafik Goubran (Carleton University, Canada)
Monique Frize (Carleton University, Canada)
Frank Knoefel (Elisabeth Bruyère Research Institute, Canada)

12:00 **A multidimensional approach to postural sway modeling**

Angelo Sabatini (Scuola Superiore Sant'Anna, Italy)
Andrea Bravi (Scuola Superiore Sant'Anna, Italy)

12:20 PM – 2:00 PM **Lunch**

2:00 PM - 3:00 PM

Medical signal processing and pattern classification II

Session Chair: Miodrag Bolic, University of Ottawa, Canada

2:00 Adaptive Neuro-Fuzzy Inference System for Oscillometric Blood Pressure Estimation

Mohamad Forouzanfar (University of Ottawa, Canada)
Hilmi R. Dajani (University of Ottawa, Canada)
Voicu Z. Groza (University of Ottawa, Canada)
Miodrag Bolic (University of Ottawa, Canada)
Sreeraman Rajan (DRDC-Ottawa, Canada)

2:20 Confidence Interval Estimation for Blood Pressure Measurements with Nonparametric Bootstrap Approach

Soojeong Lee (University of Ottawa, Canada)
Miodrag Bolic (University of Ottawa, Canada)
Voicu Z. Groza (University of Ottawa, Canada)
Hilmi R. Dajani (University of Ottawa, Canada)
Sreeraman Rajan (DRDC-Ottawa, Canada)

2:40 Heart Disease Classification through HRV analysis using Parallel Cascade Identification and Fast Orthogonal Search

Shermeen Nizami (Carleton University, Canada)
James R. Green (Carleton University, Canada)
Mikael Eklund (University of Ontario Institute of Technology, Canada)
Carolyn McGregor (University of Ontario Institute of Technology, Canada)

3:00 PM – 3:20 PM

Coffee Break

3:20 PM - 4:40 PM

Medical imaging systems and applications

Session Chair: Domenico Grimaldi, University of Calabria, Italy

3:20 Plate Analyzer - A Yeast Colony Size Measurement System

Owen Wetherow (Carleton University, Canada)
James Green (Carleton University, Canada)
Adrian D.C. Chan (Carleton University, Canada)
Ashkan Golshani (Carleton University, Canada)

3:40 Blind Correction of Human Lymphocyte Images by Optimal Thresholding in UWT Domain

Domenico Grimaldi (University of Calabria, Italy)
Frensenso Lamonaca (University of Calabria, Italy)
Alfonso Nastro (University of Calabria, Italy)

4:00 Imaging of Biomedical Turbid Tissue Using Catheter Swept-Source Optical Coherence Tomography

Youxin Mao (National Research Council of Canada, Canada)
Costel Flueraru (National Research Council of Canada, Canada)
Shoude Chang (National Research Council of Canada, Canada)
Dan P. Popescu (National Research Council Canada, Canada)
Michael G. Sowa (National Research Council Canada, Canada)

4:20 3D Striatum Reconstruction of ¹²³Ioflupane SPECT Images for Quantitative Assessments on the Dopaminergic Neurotransmission System

Alberto Faro (University of Catania, Italy)
Daniela Giordano (University of Catania, Italy)

Carmelo Pino (University of Catania, Italy)
Concetto Spampinato (University of Catania, Italy)
Angela Di Stefano (CNR Neuroscience Institute, Italy)

4:40 PM – 5:00 PM **Coffee Break**

5:00 PM - 6:00 PM **Medical Imaging systems and applications II**

Session Chair: Voicu Groza, University of Ottawa, Canada

5:00 **Multifractal Analysis of Arterial Spin Labeling Functional Magnetic Resonance Imaging of the Brain**

Filipe Soares (University of Beira Interior, Portugal)

Inês Sousa (Instituto Superior Técnico, Portugal)

Filipe Janela (Siemen Healthcare, Portugal)

João Seabra (Siemens Healthcare, Portugal)

Manuela Pereira (University of Beira Interior, Portugal)

Mario Freire (University of Beira Interior, Portugal)

5:20 **Medical Image Segmentation – A Comparison of Two Algorithms**

Liana Stanescu (University of Craiova, Romania)

Dumitru Dan Burdescu (University of Craiova, Romania)

5:40 **Design and Implementation of an Embedded Monitor System for Detection of a Patient's Breath by Double Webcams**

Ying-Wei Bai (Fu Jen Catholic University, Taiwan)

Wen-Tai Li (Fu Jen Catholic University, Taiwan)

You-Wei Chen (Fu Jen Catholic University, Taiwan)

6:00 PM – 6:20 PM **Closing Remarks**