Guest Editorial
Special Section on the 2009 IEEE International Workshop on Medical Measurements and Applications

The fourth edition of the IEEE International Workshop on Medical Measurements and Applications (MeMeA’09) was held on May 29–30, 2009, in Cetraro, Cosenza, Italy, at the Grand Hotel San Michele, on the rocky coast of the Calabria region.

The Workshop has been sponsored by the IEEE Instrumentation and Measurement Society (IMS) and organized in collaboration with the IMS TC-25 “Medical and biological measurements;” the Department of Electronics, Computer Science and Systems, University of Calabria; and the Department of Engineering, University of Sannio.

As in the previous editions, which were held in Ottawa, Canada (2008), Warsaw, Poland (2007), and Benevento, Italy (2006), the Workshop mainly dealt with any interaction between the instrumentation and measurement field, and the medical field. Measurement methods and instrumentation, as well as information processing algorithms, play the role of increasing the importance of the estimation of physiological parameters needed for disease diagnosing, health monitoring, or patient rehabilitation.

The importance of measurement problems in medical applications is growing continuously, as novel, sophisticated techniques disseminate with unprecedented speed transforming established practices and enabling new ones, from remote monitoring and mentoring of patients to personal health care systems.

In order to offer new and exciting technical information and to make the MeMeA Workshop a forum where highly qualified researchers working in various domains concerning medical applications can share information and discuss about their experience and needs, a number of important events and activities were scheduled as follows:

1) three invited lectures:
   a) Prof. G. Cuda of the School of Medicine, “Magna Graecia” University of Catanzaro, Catanzaro, Italy, presented the keynote on “Bioengineer meets Medicine school: Experiences and cooperation at University Magna Gracia.”
   b) Prof. R. C. Murphy of the Carnegie Mellon University, Pittsburgh, PA, presented the keynote on “Analysis and modeling of subcellular location on a proteome-scale: Implications for systems biology and medicine.”
   c) Prof. F. Fera of the School of Medicine, “Magna Graecia” University of Catanzaro, presented the keynote on “Human brain mapping: The basis of the bold fMRI signal.”
2) a Special Session and a Round Table on “Image Measurement for Medical Applications;”
3) a meeting of the TC-25 Subcommittee for Objective Blood Pressure Measurement about the IEEE P1721 draft standard on Objective Measurement of Systemic Arterial Blood Pressure in Humans.

Although the techniques and applications to several medical fields are diverse, all papers submitted to the MeMeA 2009 Workshop have a common denominator in the measurement-related concepts.

Seventy-two papers were submitted to the Workshop by researchers coming from universities, research institutes, and companies of 17 countries. Fifty-seven papers were presented and discussed among the participants.

Some of the papers presented at MeMeA 2009 have been submitted to the IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, and 12 passed the review process in time to be published in this Special Section, providing a small, although significant, survey of the most advanced scientific activity in this field.

Among the main topics discussed during the Workshop, the published papers in the SI deal with the following:

1) measurement methods for medical applications, such as assessment of the motor rehabilitation of the patients, cell analysis, and measurement of heart rate variability;
2) measurement systems and sensors, such as multiparameter health monitors, fMRI systems for the assessment of the olfactory function of the patients, and remote electrocardiogram analyzers;
3) measurement software for image-based breast cancer diagnosis and heart stroke rehabilitation.

For the first time in an IMS conference, all the presenters that signed an explicit permission form have been video recorded during their speeches.

Digital Object Identifier 10.1109/TIM.2010.2064471
We hope that the readers find this Special Section to be useful and that its contents can trigger new research activity in the field of medical applications of measurement science.

We would like to sincerely thank Prof. R. Zoughi for having agreed to publish this Special Section, the authors for the time and effort they dedicated in preparing their manuscripts, and all the highly qualified reviewers, whose work made the publication of this Special Section possible. We also thank C. Ingelin for her precious support in handling the whole editorial process.

DOMENICO GRIMALDI, Guest Editor
Department of Electronics, Computer Science and Systems
University of Calabria, Rende (CS)-Italy
(e-mail: grimaldi@deis.unical.it)

SERGIO RAPUANO, Guest Editor
Department of Engineering
University of Sannio, Benevento-Italy
(e-mail: rapuano@unisannio.it)

Domenico Grimaldi (M’94–SM’10) received the Dr. Ing. degree (cum laude) in electrical engineering from the University of Naples, Naples, Italy, in 1979.

After being an Independent Consultant, in 1990, he joined the Department of Electronic, Computers and System Science (DEIS), University of Calabria, Arcavacata di Rende, Italy, where he is currently an Associate Professor of electronic measurement. He has remained there in a variety of research and management positions. From 1999 to 2010, he was responsible for a research unit in the frame of a national project PRIN supported by the Italian Ministry for University and Research. From 1997 to 2001, he was responsible of “Tempus” and “Leonardo da Vinci” projects supported by the European Union. From 1998 to 2004, he was a delegate of the Rector of the University of Calabria. He has authored and coauthored more than 200 papers published in international journals and conference proceedings. His current research interests include the characterization of measurement transducers, neural modeling for analog-to-digital converter and measuring systems, digital signal processing for monitoring and testing, virtual instrumentation and distributed measurements, and telecommunication system measurement.

Dr. Grimaldi is a member of the Italian Institute of Electrical Engineers (AEI). From 1998 to 2000, he was the AEI Vice-President for the Calabria Region. He is a Coordinator of the Working Group “e-tools for I&M Education” of the IEEE Instrumentation and Measurement Society and Technical Committee TC-23 “Education in Instrumentation and Measurement.” He was a co-Guest Editor of SI IMTC 2006, and is Associate Editor for the IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT.

Sergio Rapuano (M’00–SM’10) received the M.S. degree (with honors) in electronic engineering and the Ph.D. degree in computer science, telecommunications, and applied electromagnetism from the University of Salerno, Salerno, Italy, in 1999 and 2003, respectively.

He is currently an Assistant Professor of electric and electronic measurement with the Faculty of Engineering, University of Sannio, Benevento, Italy. He has published more than 100 papers on journals, books, and conference proceedings. His research interests include digital signal processing for measurement in telecommunications, analog-to-digital converter and digital-to-analog converter characterization, distributed measurement systems, virtual laboratories, and medical measurement.

Dr. Rapuano is a member of the IEEE Instrumentation and Measurement Society TC-10 “Waveform generation, measurement and analysis,” TC-23 “Education in instrumentation and measurement,” and TC-25 “Medical and biological measurements”; the IEEE Standards Association; and the Italian Institute of Electrical Engineers (AEI). He was the recipient of the Outstanding Young Engineer Award in 2007 from the IEEE Instrumentation and Measurement Society.