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Monday, May 30

10:00 AM - 10:30 AM - Plenary Session - Invited Lecture

Room: *Sala Europa*

Chairs: *Gregorio Andria (Politecnico di Bari, Italy), Mario Savino (Politecnico di Bari, Italy)*

Issues in Medical Measurements

Voicu Groza (University of Ottawa, Canada)

Non-invasive blood pressure measurement is the only application where direct measurement methods from other fields could not be applied for practical and ethical reasons. Direct measurement of blood pressure is invasive, and, as such, it has a very limited clinical value. On the other hand, we know little about the physics of blood pressure. Indeed, the nature of the Korotkov sound is still barely investigated, although millions of measurements are made daily based on it. The pulsatile flow of smart fluids in collapsible tubes has yet to benefit from a rigorous scientific description. Blood pressure measurement remains a problem. New solutions are being proposed, such as Biosign UFIT®, toward meeting the need in health care, where the goal of measurement is not “numbers” but insights. In measurements of blood pressure, blood glucose and other such parameters, what we wish to know is the measure in which a certain condition (e.g., high blood glucose) is at the root of a certain complaint (e.g., loss of sight). The answer is not straightforwardly provided by measurements of blood glucose. In short, medical measurements are complex in that the measures we seek to obtain include, but are not limited to merely getting the numbers. The challenge is clear – and we see efforts being made to meet it. Let us welcome these efforts and look forward when medicine will finally get the kind of measurement science that is not imported from far-away fields, but one that emerges naturally from its ultimate goals – the promotion and restoration of health - in conformity to the nature of life. In order to show the work of the research team in this field, we have realized a practical demo, organized as a panel, with Dr. Leca and Dr. Mihalas, entitled "Biosign UFIT TEN-20: First commercial system for monitoring blood pressure and blood glucose". This demo is available in the same Conference Room.

11:00 AM - 12:40 PM

A.1.1: Biosignal Processing I

Room: *Sala Europa*

Chair: *Abdulmotaleb El Saddik (University of Ottawa, Canada)*

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12:40 PM - 1:10 PM - Plenary Session - Invited Lecture

Room: *Sala Europa*

Chair: *Octavian Adrian Postolache (Institute of Telecommunication - IT/IST & Escola Superior de Tecnologia de Setubal, Portugal)*

Measurement, complexity and clinical decision making

Umberto Giani (University of Naples "Federico II", Italy)

The present paper is an attempt to explore the role of measurement in clinical decision-making. First an outline of the bayesian approach to clinical evidential reasoning is carried out. Then, the complex and somewhat counterintuitive features of the dynamics of physiological variables in health and illness are described. Finally, the diagnostic and prognostic value of the measures of biological complexity is discussed.

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C 1.3: Imaging and Communication III

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Tuesday, May 31

8:50 AM - 9:20 AM - Plenary Session - Invited Lecture

Room: *Sala Europa*

Chair: *Marcello Salmeri (University of Rome Tor Vergata, Italy)*

Dual-Parabolic Modeling of the Superior and the Inferior Temporal Arcades in Fundus Images of the Retina

Rangaraj M. Rangayyan (University of Calgary, Canada)

Monitoring the openness of the inferior and the superior temporal arcades (ITA and STA) in retinal fundus images and how they change over time can facilitate improved diagnosis and optimized treatment of myopia and retinopathy of prematurity. We propose methods for the detection and modeling of the ITA and the STA, including Gabor filters to detect retinal vessels, and the generalized Hough transform to detect and parameterize semi-parabolic forms. Results obtained with 40 images of the DRIVE database, compared with traces of the temporal arcade drawn by an expert ophthalmologist, indicate a low mean distance to the closest point error of 12.33 pixels (0.25 mm). The proposed methods should facilitate quantitative analysis of the ITA and the STA and overcome limitations associated with subjective manual analysis.

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Manuel Abbafati (University of Rome Tor Vergata, Italy)

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B 2.1: Biosignal Processing IV

Room:

Chair: Wendy Van Moer (Vrije Universiteit Brussel, Belgium)

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A.2.3: Special Session on Methods for the Detection and Characterization of Lesions in Medical Images

Room: *Sala Europa*

Chairs: *Rangaraj M. Rangayyan (University of Calgary, Schulich School of Engineering, Canada), Marcello Salmeri (University of Rome Tor Vergata, Italy)*

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B 2.3: Environmental Medicine and Patient safety

Room: *Sala Federico*

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