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ADVANCES IN SENSORS, SIGNALS AND MATERIALS

3rd WSEAS International Conference on SENSORS and SIGNALS (SENSIG '10)

3rd WSEAS International Conference on MATERIALS SCIENCE (MATERIALS '10)

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Preface

This year the 3rd WSEAS International Conference on SENSORS and SIGNALS (SENSIG '10) and the 3rd WSEAS International Conference on MATERIALS SCIENCE (MATERIALS '10) were held at the University of Algarve, Faro, Portugal, November 3-5, 2010. The conferences remain faithful to their original idea of providing a platform to discuss sensors, optical radiation, photodetectors, data acquisition systems, detection theory, sensor circuits, time synchronization, target tracking, bandwidth management, encryption algorithm, digital signal processing, image processing, optical communications, speech processing, computer music, robotics, nanotubes and nanowires, epitaxial materials and devices, point and extended defects in mismatched materials, spin-dependent (or spintronic) electronic materials, dilute nitride semiconductor etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be indexed by ISI. Please, check it: www.worldses.org/indexes as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors

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Plenary Lecture 1

Collaborative Sensors Data Processing and Environment Information Infrastructure as Means to Support Autonomous Actions of Service Robots

Professor Vitaliy Rybak
Department of Postgraduate Studies
Tecnological University of the Mixteca
Carretera a Acatlima Km. 2.5, Huajuapan de Leon, Oaxaca
MEXICO
E-mail: rybak@mixteco.utm.mx

Abstract: The new trends in robotics research have a general goal of developing personal and professional service robots that presupposes the robots operation in an unstructured environment. In this case one of the key problems is the problem of constructing in real time the model of dynamic robot surroundings using sensors data processing. Different sensors are differed markedly between each other by the price and by their technical characteristics such as accuracy of measurements, spatial resolution, speed of measurements and time of data processing. The more information about surroundings it is possible to get, the more expensive and time consuming is the sensor. To solve existing basic contradictions, we suggest to use a combination of various ways, both traditional - working out of more perfect and inexpensive sensors and data processing means, and nonconventional - such which, at first sight, can seem not concerning a considered problem. Offered working out of an canonic stereosystem on the base of commercial cameras and the simplified control system of a choice of the calibrated focal length of monocameras can serve as an example of the traditional way. Collaborative processing of various data, visual and non-visual, and information infrastructure of robot environment relate to the nonconventional ways. Proposed collaborative sensors data processing is used to cut down analyzed space of scene by directed selection of the area of interest and to replace the pattern recognition problem solving by the verification of the state of known scene. As more often used sensors does not manage to be synchronised, the scheme of sensors data labeling by the measurement instants is offered. Designing the robot environment information infrastructure, we follow the practice of human being in creation of the information infrastructures to provide his safe existence. We propose visual information landmarks that can be easily recognized by the mono- and stereovision systems and permit them to define their 3D spatial position with respect to landmark coordinate system. It allows us to realize an environment model representation as an hybrid of topological and metrical maps. Finally we present the examples of autonomous actions of service robots.

Brief Biography of the Speaker: Vitaliy Rybak received the Diploma in radio-physics from the Kiev State University, Ukraine, 1958, and Ph. D. degree in Technical Cybernetics from the Institute of Cybernetics of the Academy of Sciences of Ukraine, 1968.
Since 1958 till 2000 he was with the Institute of Cybernetics of the Academy of Sciences of Ukraine. From 1975 to 2000 he was the scientific director of the National Scientific Seminar of Ukraine “Scientific and Engineering Problems of Robotics”. From 1982 to 2000 he was the head of Department of Informatics in Robotics of the Institute of Cybernetics of the Academy of Sciences of Ukraine. From 1989 to 2000 he was the director of the Section of Robotics of the Scientific Council of the Automation of the National Academy of Sciences of Ukraine. From 2000 till now he is a professor of the Technological University of the Mixteca, Mexico; director of the Laboratory of Robotics of the same university.
His major research interests include Intelligent Robotics (autonomous robot architecture, 3D robotics vision, 3D stereo measurement, 3D object recognition and scene analysis, goal directed robot’s behavior planning), Image Processing, and Pattern Recognition.
He has published the book and more than 140 papers in Intelligent Robotics, Image Processing, and Pattern Recognition. He was the responsible editor of 13 books in Artificial Intelligence, Intelligent Robotics, Image Processing, and Pattern Recognition. He was the director of numerous international and national research projects in Image Processing, Pattern Recognition, and Intelligent Robotics.
He is the winner of the National award in the field of science and technology of Ukraine, 1993.

Plenary Lecture 2

Novel Fluorescence Methods for Biotechnological and Biomedical Sensoring: Assessing Antioxidants, Reactive Radicals, Superoxide and NO Dynamics, Immunoassay and Biomembranes Fluidity

Professor Gertz I. Likhtenshtein
Department of Chemistry
Ben-Gurion University of the Negev
Beer-Sheva 84105 Israel
E-mail: gertz@bgu.ac.il

Abstract: We proposed and developed a series of fluorescent methods for analysis and investigation of biological systems with a view of future biotechnological and biomedical applications. The methods we describe have been built upon several photochemical and photophysics phenomena including fluorescence quenching, photochrome photoisomerization, and singlet-singlet and triplet-triplet energy transfer [1]. Three new types of molecular probes have been developed and employed for such studies: 1) dual fluorophore-nitroxide compounds [2-11]. fluorescent-photochrome molecules [12-18], super molecules containing both fluorescent and fluorescent quenching segments [19]. The fluorescence properties of the new probes were intensively exploited for several practical applications including a real time analysis of antioxidants, nitric oxide, superoxide, reactive radicals, trinitrotoluene and metal ions in picomolar concentration scale, investigation of molecular dynamics (fluidity) of biomembranes in a wide range characteristic times from seconds to nanoseconds, and characterization of surface systems. Owning high sensitivity, simplicity, availability of fluorescence techniques, these methods can be widely employed using standard fluorescent techniques and are potentially adaptable to fibrooptic sensoring and focal microscopy.

Brief Biography of the Speaker: Gertz I. Likhtenshtein received his PhD (1963) and Doctor of Science (1972) degrees at the Semenov Institute of Chemical Physics, Russian academy of Science, Moscow. In 1976 this Institute granted him the Professor title. In 1965 he was appointed on the position of Head of Laboratory of Chemical Physics of Enzyme Catalysis. In 1992 Likhtenshtein moved to the Department of Chemistry, the Ben-Gurion University of Negev (Israel) on the full Professor position, was in charge of the Laboratory of Chemical Biophysics and has been emerited in 2003. Among his awards are the Medal of the Exhibition of Economic Achievement, the Diploma of Discovery USSR for works on nitrogen fixation , the USSR State Price for pioneering research on spin labeling in molecular biology, the V. V. Voevodsky International Price for Chemical Physics and the Diploma of the Israel Chemical Society. He is a member of the International ESR Society, the American Biophysical Society, the Israel Chemical Society and the Israel ESR Society. At present his main scientific interests focus on mechanism of the light energy conversion and on novel methods of immunoassay, NO and antioxidants analysis. Likhtenshtein authored 10 scientific books and about 380 papers.

Plenary Lecture 3

Principle of Polysaccharide Gels

Professor Masakuni Tako
Department of Subtropical Bioscience and Biotechnology
University of the Ryukyus
1 Senbaru, Nishihara, Okinawa 903-0213, Japan
E-mail: tako@eve.u-ryukyu.ac.jp

Abstract: Polysaccharides are often used as thickening, stabilizing and gelling agents in the food and nonfood industries. The structure-function relationship of the polysaccharides from the view point of the rheological characteristics in aqueous solutions has been developed and accomplished.
Gelation mechanism: Gelation mechanism for kappa-carrageenan, iota-carrageenan, agarose (agar), deacetylated gellan gum, alginic acid, curdlan, amylose, deacetylated rhamsan gum and native gellan has been analyzed at the molecular level where sulfate oxygen, ring oxygen, hemiacetal oxygen, cations, hydroxyl groups, and methyl groups take part in the intra- and intermolecular associations with ionic bonding, electrostatic forces of attraction, hydrogen bonding and van der Waals forces of attraction.
Co-gelation mechanism: Synergistic co-gelation mechanism of Xanthan gum produced by plant pathogen bacterium (Xanthomonas campestris) with galactomannan (locust-bean gum, tara-bean gum, guar gum, Leucaena galactomannan and Delonix regia galactomannan), and with konjac glucomannan, where trisaccharide side-chains of the former molecules including pyruvate groups contributed with hydrogen bonding and van der Waals forces of attraction has been analyzed.
Thermal stability: The molecular origin for the thermal stability for viscosity and dynamic viscoelasticity of non-gelling welan, rhamsan, S-657, S-88, S-198 gum, schizophyllan and amylopectin (rice, potato and wheat) the structure of which is similar to that of gelling gellan, curdlan and amylose has been analyzed. Especially, the gellan gum families of the polysaccharides (welan, rhamsan, S-657, S-88 and S-198 gum) have given a good opportunity to investigate the structure-function relationship of the polysaccharides.
Gelatinization and retrogradation mechanism of starch: Gelatinization and retrogradation mechanisms of rice, potato and wheat starches have been analyzed.
Principle of polysaccharide gels: From the results and discussions, the principle of the polysaccharide gels has been established. Though many investigations concerning the gelling properties of the polysaccharides have been done to discuss structure-function relationship, no one has established gelation mechanism at the molecular level except the author.

Brief Biography of the Speaker: Masakuni Tako Ph D is a professor of Department of Subtropical Bioscience and Biotechnology, University of the Ryukyus, Okinawa, Japan. His area of expertise is polysaccharide bio-physical chemistry. Besides being an author and co-author of 105 papers, he wrote 3 chapters in different books of polysaccharides. He has also published 3 books of Ludwig van Beethoven who is famous music composer. Awards Research promotion award in Okinawa "Study on the application of membranes in sugar manufacturing industry"(1996). Award of the Japanese Society of Applied Glycoscience "Studies on the gelation mechanism of polysaccharides, and development and application of fucoidan from commercially cultured Cladosiphon okimuranus"(2008).

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