Recent Advances in Energy, Environment, Biology and Ecology

Editor

Vincenzo Niola

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- Proceedings of the 10th WSEAS International Conference on Energy, Environment, Ecosystems and Sustainable Development (EEESD '14)

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- Proceedings of the 3rd WSEAS International Conference on Biomedicine and Health Engineering (BIHE '14)

Tenerife, Spain, January 10-12, 2014

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Preface

This year the 10th WSEAS International Conference on Energy, Environment, Ecosystems and Sustainable Development (EEESD '14), the 11th WSEAS International Conference on Mathematical Biology and Ecology (MABE '14) and the 3rd WSEAS International Conference on Biomedicine and Health Engineering (BIHE '14) were held in Tenerife, Spain, January 10-12, 2014. The conferences provided a platform to discuss environment and sustainable development, climate and global change, energy storage, biodiversity, bioengineering, evolutionary biology, molecular dynamics, computational biochemistry, medical imaging, medical informatics, pharmaceutical applications, protein modeling, enzyme engineering, health management 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 sent to international indexes. They will be also available in the E-Library of the WSEAS. Extended versions of the best papers will be promoted to 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

Modeling-Simulation and Control of a Multi-Machine Power System

Professor Dimitrios Bandekas
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Abstract: This lecture presents a new modeling and simulation method for the dynamic performance analysis of a multi-machine power system under a symmetrical and unsymmetrical fault conditions. Transient analysis of the system is based on a-d-c phase coordinates. An adaptive excitations controller is applied to a generator in a multi-machine power system to improve the dynamic stability characteristics.

Brief Biography of the Speaker: Prof. Bandekas obtained his Diploma in Electrical Engineering in 1990 and his Ph.D. in 1994, from the Democritus University of Thrace. He joined the Kavala Institute of Technology in 1995 as an assistant professor, and became permanent professor at the Department of Electrical Engineering in 2002. Since 1998 he is Head of Faculty of Electrotechnics and Electric Measurements, Department of Electrical Engineering and is also a member of the Technical Committee of KavTech. Prof. Bandekas is also vice-president of Academic Affairs. His research interests include: Modeling and simulation, power systems and automated energy systems, biomechanics and systematic measurements. He has 50 articles in recognized and prestigious international scientific journals and seven (15) articles in international and national conferences with a jury system. He has participated as a researcher in sixteen (16) research projects of which the nine (9) as project leader. He is the founder and editor (Editor-in-Chief) of the recognized and prestigious international journal 'Journal of Engineering Science and Technology Review'' (www.jestr.org), which was incorporated in 2011 in the prestigious scientific database SCOPUS, and is one of the most recognized scientific journals of CERN.

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Plenary Lecture 2

How to Contribute to Sustainable Development Education in a Engineering High School: Concrete Example of a Transdisciplinary Project and Hand Made Didactical Tool

Professor Philippe Dondon
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Abstract: Since Rio de Janeiro conference (1992), Kyoto protocol and agenda 21 definitions, the necessity of a harmonious development is now admitted by a majority of scientific and political personalities. Even if sustainable development is a complex concept, which concerns a wide range of social, scientific, economical and environmental issues, each of us is able to do something for humanity evolution, in particular in the education field. Thus, our project started through an individual questioning of a few teachers, two years ago: What can we include in our research field and/or pedagogical thematic to have a concrete action in sustainable development, while respecting the mains scientific fields of our engineering school? The "small scale green house" project was born. We explain the main steps of the model design; It consists of a scaled hand made "green" house built with genuine materials and scaled power plants accessories like hydrogen fuel stack, solar tracking system, solar tower... Then, we give some concrete and various didactical applications such as thermal losses investigations, carbon assessment, solar tracking system electronic design to show the transdisciplinary aspects of this work. Finally, some future evolutions are suggested.

Brief Biography of the Speaker: Ph. Dondon was born in 1960. He is a graduate from the High School of Electronic Engineers ENSEIRB Bordeaux, France. After his electronic engineer diploma in 1983, he worked 5 years as product manager and computer aided manufacturing (C.A.M) in the French radio-communication systems company T.R.T. Back to the IMS Microelectronic Laboratory of Bordeaux, he received his Ph D in microelectronic analogue design in 1992. He is now teaching electronic at ENSEIRB- MATMECA and has several interests in electronic circuits and electronic for sustainable development fields of research.

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Plenary Lecture 3

The Spatial Distributions of Aerosol Deposition and Concentrations in Asia During the Year of 2010

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Also with:
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Abstract: Asia is one of the major sources of both natural (Asian dust) and anthropogenic aerosols in the world. Asian dust that is a typical example of mineral aerosols occurs in northern China, Mongolia and central Asia of the arid and semi-arid desert regions more frequently during the spring season due to desertification in some of source regions and has its increasing occurrence trend. Anthropogenic aerosols that are mainly originated from human activities and the formation by gas-to-aerosol conversion of pollutant have also an increasing trend due to the rapid economic expansion in many Asian countries especially in China. Therefore, atmospheric aerosols in the Asian region are the complex mixture of various aerosols such as Asian dust and anthropogenic aerosols. Atmospheric aerosols can affect the quality of our lives significantly because of its potential impacts on human health and the environment. The sub-micrometer size of aerosols can be inhaled and may pose certain health hazards. Because aerosols also scatter and absorb radiation they strongly influence the radiative budget of the Earth-Atmosphere system; they also reduce visibility and diminish the aesthetic scenery. Depositions of aerosols can affect significantly the terrestrial and marine ecologies. However, all these effects are not clearly quantified due to the lack of statistical aerosols data.
The Aerosol Modeling System(AMS) composed of the Asian Dust Aerosol Model2 (ADAM2) for the Asian dust aerosol modeling and the Community Multi-scale Air Quality (CMAQ) model for the anthropogenic aerosol modeling has been employed to provide the spatial distributions of all kinds of aerosols (Asian dust, Secondary inorganic aerosol(SIA), Secondary organic aerosol(SOA), organic carbon(OC), Black carbon(BC), sea salt and emitted PM10) in Asia for the whole year of 2010. The simulated results can be used for the impact assessment of aerosols on the environment. The AMS model and the model results are to be discussed in this presentation.

Brief Biography of the Speaker: Dr. Soon-Ung Park holds a BSc in Meteorology from the Seoul National University in Korea, an MSc in Meteorology from the University of Wisconsin-Madison in USA and a PhD in Atmospheric Sciences from Oregon State University in USA. He worked as a Research Associate and an Assistant Professor in University of Wisconsin-Milwaukee in USA (1978-1981). Since 1981, he had been served at the Department of Atmospheric Sciences of Seoul National University in Korea as an Assistant Professor, Associate Professor and Professor before he retired from Seoul National University in 2006. As a Professor Emeritus of Seoul National University, he founded “Center for Atmospheric and Environmental Modeling (CAEM)” in 2006 to pursue further studies on Atmospheric Environmental Issues including air pollution dispersion, anthropogenic aerosols, dust aerosols, acidic rain and carbon cycles in the forests. He has developed an operational Asian Dust Aerosol Model 2 (ADAM2) that is now used as an Asian dust forecasting model in Korea Meteorological Administration (KMA). He is interested in the development of an Aerosol Modeling System that includes both dust aerosols and anthropogenic aerosols. He has published more than 200 papers in major reviewed journals, more than 150 in conference proceedings and more than 100 granted technical reports. Recently he served as a chairman of Asian Node of World meteorological Organization (WMO) Sand and Dust Storm Warning and Assessment System (SDS-WAS) from 2008 to 2012. He is now the Director of CAEM and a committee member of Regional Steering Group WMO SDS-WAS. He had been awarded an Academic Prize and a Distinguished Service Medal from Korean Meteorological Society, Letter of Commendations by President of Korea, Minister of Science and Technology of Korea and Minister of Education of Korea. He had received Seoul Citizen Cultural Prize by Mayor of Seoul and A Distinguished Service Red Color Decoration by the Republic of Korea. He had been cited 2000 outstanding scientists of the 21 century by American Biographical Institute and International Biographical Center, Cambridge, England.

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Plenary Lecture 4

Differential Fluid Mechanics: The Instrument for Calculating of the Environment Dynamics and Structure

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Abstract: Modern technique visualized a fine structure of fluid and gases in a wide range of spatial scales ranging from astronomical units to millimeters in the laboratory. New agreed analytical and numerical approach is developed for simultaneous calculations of processes dynamics and a structure. Calculations are based on the fundamental set of governing equations presenting in differential form the basic laws of conservations of mass, momentum, complete energy and constituents supplemented by the equation of state. Condition of the compatibility defines the rank of the total set, the order of its linearized version and the degree of the characteristic equation. All solution of the set for particular boundary conditions are searched by singular asymptotic methods or numerically. Several particular problems are analyzed in fine details. Calculations of diffusion induced flows on different topography are compared with laboratory modelling of the flow in stratified tank and observations in the atmosphere. Fine structure of periodic and lee internal waves is calculated and compared with laboratory data in a wide range of parameters including strong interaction between fine components causing trauma of initially smooth stratification. Transport of different solid and liquid substances in a stationary vortex flows is measured and compared with current theory. Extrapolation results on the environment is discussed.

Brief Biography of the Speaker: Yuli D. Chashechkin was born in 1960. He is a graduate from the Moscow Engineering Physical Institute, Moscow, Russia on 1964. After post graduate courses there he worked and research scientist and head of the laboratory at the All-Union Research Institute of Physical and Radio-technical Measurements of the USSR GOSSTANDRD. Since 1981 he is working as Head of the Fluid Mechanics Laboratory at the A.Yu. Ishlinskiy Institute for in Mechanics of the Russian Academy of Sciences and is guiding the Scientific-Educational Center RAS and M.V. Lomonosov Moscow State University. His research interest in geophysical fluid mechanics includes optic and acoustic visualisation, theory of environment flows.

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Plenary Lecture 5

Energy Efficient Renovation of Ventilation in Residential Buildings and Educational Premises in Cold Climate

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Abstract: The presentation describes the situation in schools and apartment buildings because their indoor climate is the most problematic. An overview of the indoor climate in schools and apartment buildings is given on the basis of their maximum CO2 levels. Recent studies in Estonia have shown very high CO 2levels in the classrooms of unrenovated schools. Unfortunately, in many renovated schools the situation is not much better. This is due to excessive economising. The ventilation systems often work with partial productivity. Researches show high CO2 levels in partially renovated apartment buildings.
As the density of students in classrooms is high, mechanical ventilation with heat recovery is required. The question is whether it should be central or local classroom-based.
The possible solutions of ventilation in renovating old apartment buildings are:
-Balancing ventilation with heat recovery - difficult to use in the renovation of old apartment buildings. The problem is: Where to install supply air channels?
-Apartment based balancing ventilation with heat recovery - difficult to use in old apartment buildings as people do not like duct installation in a flat. -Exhaust mechanical ventilation with the heat pumps and fresh air valves in living rooms - one of the possible systems.
-Installation of room based air handling units (AHU) and exhaust ventilators in the WC, bathroom and kitchen - one of the possible most efficient solutions.
-Mechanical exhaust ventilation (not energy efficient as there is noheat recovery)
-Fresh air valves in living rooms with natural exhaust ventilation – high heating costs because there is no heat recovery.
As exhaust mechanical ventilation with heat pumps and room based AHU are usable and energy efficient solutions, the presentation focuses on their research results.

Brief Biography of the Speaker: T.-A.Koiv received his M.Sc. in Thermal Engineering from the Tallinn University of Technology and the PhD at the Institute of Civil Engineering of St Petersburg in Heating, Heat Supply, Ventilation and Air Conditioning in 1978. Since 2003 he has been Full Professor of the Chair of Heating and Ventilation at the Tallinn University of Technology, Estonia. He has read several courses in the field of Thermal Engineering, Heat Supply, Heating, Ventilation and Air Conditioning, Renovation of HVAC systems at the Tallinn University of Technology. At present he supervises 6 PhD students. Prof T.-A.Koiv has 18 inventions and patents in the field of Heating and Heat Supply. He is an active researcher in the field of energy efficiency, indoor climate and building service systems. He is the author of the 10 books and textbooks. T.-A. Koiv has published more than 140 papers in books, journals and conference proceedings. Prof. Koiv has received REHVA Professional Award for energy efficiency of buildings (2013) and an award of Silver medal for his inventive activities at the Exhibition of the Achievements of National Economy.
He is vice dean (in the field of science) of the Civil Engineering Faculty of the Tallinn University of Technology and head of several projects (Baltic cooperation in energy efficiency and feasibility in urban planning – ENEF, Development of efficient technologies for airchange and ventilation necessary for the increase of energy efficiency of buildings, Decreasing the consumption of heat energy by awareness rising and performance of consumers based on measurements of individual heating costs, Minimum requirements for energy performance - additional analysis, New international master program “Energy Efficiency of Buildings”, Energy Auditing and Certification of Buildings, Doctoral School of Civil and Environmental Engineering). He is a member of CBI and WSSET. He has been reviewer of Journals and member of Scientific Committee of Conferences. His research and activity has made significant impact to national scientific and engineering communities.

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Plenary Lecture 6

Building Sustainability. Civil Engineering Approach

Professor Corneliu Bob
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Abstract: The construction industry plays an important role in the social - economic development, but has also a great impact on the local and global environment. It is a major consumer of land and raw materials and generates a great amount of waste. Furthermore, constructions through their entire lifecycle use significant amounts of non-renewable energy and contribute to the emission of greenhouse gases and other gaseous wastes.
According to some institutes, the building and construction industry uses 40% of the materials entering the global economy, consumes approximately 50% of the total energy supply and contributes with almost 50% to the total CO2 emissions released to the atmosphere through different stages, including construction, operation and demolition.
Sustainable construction has recently been identified as one of the lead markets for the near future of the whole world. It has the potential and the ability to respond to market needs, the strength of the world's industry and the necessity to support it through the implementation of public policy measures.
A sustainable construction develops the idea of low embodied energy, reduced greenhouse gas emissions, low operation and maintenance costs, responsibly sourced materials with recycled contents, durability, adaptability and comfort. In many countries directives and certificates has still been developed and adopted, which evaluate the environmental performances of buildings but also consider other important issues of sustainability.

Brief Biography of the Speaker: Prof. Corneliu BOB, graduated at the University „Politehnica" of Timisoara – Romania in 1961 and Ph.D. Civil Engineering in 1971 at the same University. In 1990 he became professor of R.C. Structures and Ph.D. – Scientific Coordinator at the Civil Engineering Faculty in Timisoara. From 1996 till 2004 he was the Head of the National Building Research Institute – Timisoara Branch.
Professor Bob has also been very active in the Romanian Associations for Civil Engineering: National Association Engineering for Structural Analysis, Bucharest, Romanian Concrete Commission, Romanian Academy – Material Science.
Member of IABSE since 1992, Prof. Bob became the member in Permanent Committee, Commission WC-8 (WC-4), Editorial Board of Structural Engineering Documents (SED) and in the same time, vice-chairmen of IABSE Romanian Group. In the last years he has been involved, with good results, in the WSEAS activities (Editor-2009, Plenary Lectures-2009, 2010, 2012, 2013).
Prof. Bob has had many and major contributions in the field of Structural Engineering:
(i). He participated as designer at more than 70 structures projects. In the last 15 years his attentions was paid to the design of the RC prefabricated structures: 25 structures have been projected and built up with more than 100000 m2 built surface. An important contribution of Prof. Bob in this field was in a patent concerning the „RC prefabricated structures with rigid nodes".
(ii). A very important field of work was paid to evaluation and rehabilitation of existing buildings. He participated at 75 projects of maintenance and rehabilitation of some important structures affected by seismic actions, gas explosions as well as time environmental factors. A very notable contribution is the „Model of reinforcement corrosion in RC Structures.
(iii). Prof. Bob C. has published many books and papers in Journals and Proceedings of National and International Meetings. The field of interest of works is: rehabilitation of structures, analysis and design of structures, durability of buildings, new special concrete types, building sustainability. Prof. Corneliu BOB played an important role in development of assessing of existing structures and in design of new buildings and he has devoted great energy in promoting the role of students and young engineers as designers and researchers.

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Plenary Lecture 7

Comparison among Three Different Gasification Reactors

Professor Martino Paolucci
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SEAR - University "Tor Vergata"
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Abstract: Thermodinamic calculations were performed in order to evaluate the performance of three different gasification reactors.
The first is a one stage reactor having at the top a catalitic zone consisting of Ni supported on Al2O3 . The injection point of oxydising gases is higher than the one of the feeding of waste and a grate, at the bottom of the reactor, allows that the ashes leave the reactor.
The other two reactor are two-stage reactors. In both, the stage one is equal to the one of the one-stage reactor except the catalitic zone, which is moved to the stage two. The difference of the two two-stage reactors consist of the different way of feeding waste and injectin oxidising gases. En fact the fedeeng of waste is allawed to one reactor only, whilist an oxidising gas can be injected in both the two-stage reactors.
Methane, biogas, RDF, and a blend of RDF and a waste oil are considered the waste fed. The thermal efficiency and the impurities content of the syngas are considered as the most important factors for evaluating all the reactors when the total content of injected oxygen and the amount of fed waste are equal. In terms of thermal efficiency, one-stage reactor and two-stage reactor, wherein the stage two allows the injection of oxygen only, show the same performance while the remained reactor shows worse performance.
As regard the cleaning of the syngas, the two first reactors were considered. In this case the syngas exiting the considered two-stage reactor taken into consideration shows a content of chlorine and sulphur very low, in comparison of the syngas that leaves one-stage reactor.
The possibility of dividing the oxigen in two stage makes the temperature of the first stage lower and that prevent the clorine and sulphur to evaporate and permits that both are eliminated with the ashes.

Brief Biography of the Speaker: He is graduated, industrial chemistry degree, at rome university "la sapienza". Previously he was a manager in ISPRA (national agency for environmental protection and technical services), Roma - Italy and at present he is a member of SEAR (co-operative society for alternative and renewable energy). Its areas of interest are: renewable and conventional energy; bio-fuels; industrial gas; hydrogen production; thermal and solar reforming. He worked in chemical research laboratories of mines (industry ministry),; after in thermodynamic centre for high temperature – chemical department of rome university "la Sapienza". During his stay in science faculty rome university "Roma Tre" he studied the optimisation of technical-economic analysis for pyrolysis and gasification processes of poor fuels such as industrial and civil organic wastes, rural biomass. After 2003, he worked at ISPRA in co-operation with chemical department of Roma University "La Sapienza" and mechanical engineering department of University "Roma Tre", on innovative gasification process development for biomass, optimisation of a innovative reactor at two stage with biomass (rural, industrial and civil waste) to reduce tar content, and increase the cleanness of the obtained syngas. He is also co-author of papers on: renewable energies, biomass, biogas, new technologies of gasification;gas treatment; utilisation of organic waste, landfill biogas, and photo-electro-chemistry process for hydrogen production.

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Plenary Lecture 8

Virtual Reality and Augmented Visualization in Medicine and Surgery

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Abstract: In medicine and surgery the Virtual Reality technology has made available new tools for diagnosis and therapy definition by translating the information contained in the medical images of the patients into 3D virtual models who are realistic replicas of real patients with their actual pathologies. This has allowed the development of a new form of medical education and training and the use of patient-specific surgical simulators has permitted to practice and rehearse the surgical procedures on digital clones of the real patients.
New applications of Augmented Reality technology, by means of the overlapping of virtual information on the real patient, provide systems that help surgeons in the intra-operative phase and permit to perform their tasks in ways that are both faster and safer. The use of the augmented visualization in surgery has the potential to bring the advantages of the open-surgery visualization also in the minimally invasive surgery.

Brief Biography of the Speaker: Lucio Tommaso De Paolis is the Director of the Augmented and Virtual Reality Laboratory (AVR Lab) at the Department of Engineering for Innovation of the University of Salento and the responsible of the “Advanced Techniques of Virtual Reality for Medicine” research groupof the DReAM (Laboratory of Interdisciplinary Research Applied to Medicine) at the Hospital of Lecce.
He received the Master Degree in Electronic Engineering from the University of Pisa (Italy) in 1994 and after, first at the ScuolaSuperioreS.Anna of Pisa and then at the Universityof Salento, his research interest has concerned the study of realistic simulators for surgical training and the development of applications of Virtual and Augmented Reality in medicine and surgery.
De Paolis has been in 2012 visiting professor at the Vytautas Magnus University of Kaunas (Lithuania), in 2011 visiting professor at the University of Tallinn (Estonia), in 2007 and 2010 visiting researcher at the Centro de CienciasAplicadas y DesarrolloTecnológico (CCADET) – Universidad NacionalAutónoma de México (UNAM) – Mexico City (Messico), and in 2007 and 2009 visiting researcher at Computer Graphics Laboratory,Sabanci University of Istanbul (Turkey).

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Plenary Lecture 9

Electro-Physics in Biology for Systematic Studies of Neural Systems

Professor Atsushi Fukasawa
Institute of Statistical Mathematics
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Abstract: He will present electro-physics as new basis for study of neural systems.
Experimental studies in cell chemistry have been widely investigated now on, reflecting motions of ions and cytoplasm in chemical process. He will present new basis of electro-physics into a neuron, and knowledge of telecommunication systems into neural systems.
He will present systematic approach to the subjects (entity) of neural systems, and the result of actual studies performed by the authors. The result of these studies is compared with the theory of “Categories” by Aristoteles in ancient Greece.

Brief Biography of the Speaker: Atsushi Fukasawa received the Master of Arts degree in Electrical communication and the Ph.D. degree from Waseda University in 1967 and 1983.
He joined Graduate School of Science and Technology, Chiba University as a professor in 1997.
He received the Award of the Agency of Science and Technology, Japan in 1967, and received the Science and Technology Prize from Ohm Fundation in 1994. He received Telecommunication System Technology Prize from the Foundation of Telecommunication Association, Japan in 2004. He is a senior member of the IEEE.

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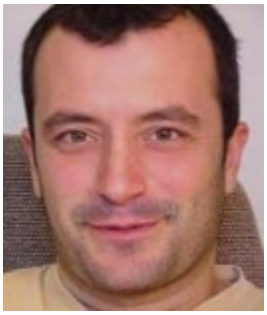
Plenary Lecture 10

Neurodegenerative Disease Detection: Use of Emotional Recognition or Emotional Stage



Professor Carlos M. Travieso-González
University of Las Palmas de Gran Canaria
Spain
E-mail: ctravieso@dsc.ulpgc.es

Abstract: The advances based on image processing and pattern recognition is generating the development of different sciences and modalities due to the multidisciplinary collaboration. Health and biomedicine are a good example. In particular, this work presents the use of emotional detection for the Neurodegenerative disease detection. It can be used for various purposes, as the detection of possible symptoms of neurological diseases or the evolution of neurological diseases in humans.
Many authors are based on guidelines set by Ekman and Friesen (1978), who developed the Facial Action Coding System (FACS) that takes parameters of the muscles of the face according to a particular emotion, classifying them into Action Units (AU) specific to each emotion.FACS include 8 emotional expressions: anger, disgust, fear, happiness, sadness, surprise, neutral and contempt. The use of FACS is not limited to the field of psychology to study human behaviour, as it also has a great importance in helpingtechnological research, as in this case, for health.
In particular, our work proposes the use of an emotion detector system for facial images.For that, facial features were extracted using spatial domains and transformed domains for subsequent classification using SVM. The distinctive part of this system is the segmentation of the image, performing a deep study that leads to obtain the significant value of each one when an emotion or its grade is detected. This has not been observed in previous studies. Finally, a discussion about the emotion identification or its grade is proposed for its use on neurological diseases.

Brief Biography of the Speaker: Carlos M. Travieso-González received the M.Sc. degree in 1997 in Telecommunication Engineering at Polytechnic University of Catalonia (UPC), Spain; and Ph.D. degree in 2002 at University of Las Palmas de Gran Canaria (ULPGC-Spain). He is an Associate Professor from 2001 in ULPGC, teaching subjects on signal processing and learning theory. His research lines are soft-biometrics, biometrics, biomedical signals, data mining, machine learning, classification system, signal, image and video processing, and environmental intelligence. He has researched in more than 35 European, International and Spanish Research Projects, some of them as head researcher. Currently, the candidate has three patents' applications in the Spanish Office of patents and brands. He is co-author of 2 books, co-editor of 8 Proceedings Book, Guest Editor for two international journals and up to 15 book chapters. He has over 200 papers published in international journals and conferences. He is being reviewer up to 22 international journals (JCR-ISI) and has been Program Committee Conference member up to 45. He is member of IASTED Technical Committee on Image Processing from 2007 and member of IASTED Technical Committee on Artificial Intelligence and Expert Systems from 2011. He will be IEEE-IWOBI 2014 General Chair, CEA 2014 General Chair; and was IEEE-INES 2013 General Chair, NoLISP 2011 General Chair, JRBP 2012 General Chair and Co-Chair on 39th Annual 2005 IEEE-ICCST. He was Vice-Dean from 2004 to 2010 in Higher Technical School of Telecommunication Engineers in ULPGC. Nowadays, he is a Vice-Dean of Head of Graduate and Postgraduate Studies from March 2013.

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Plenary Lecture 11

Acute and Long-Term Effects Elicited by Psychoactive Drugs on 50-Khz Ultrasonic Vocalizations in Rats: Development of a New Experimental Tool for the Study of Drug-Mediated Reward

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Abstract: Ultrasonic vocalizations (USVs) have recently emerged as an indicator of the emotional state of rats, and the evaluation of the USVs in the 50-kHz range has been proposed as a tool to investigate the affective properties of drugs of abuse. To clarify the relevance of 50-kHz USVs to drug-induced reward, the acute and long-term effects elicited by different psychoactive drugs [amphetamine, caffeine, 3,4-methylenedioxymethamphetamine (MDMA, ecstasy), methylphenidate, morphine, and nicotine] were characterized in adult male rats. Amphetamine and methylphenidate were the only drugs that stimulated the emission of 50-kHz USVs by rats after their acute administration. Moreover, amphetamine was the only drug that elicited a significant emission of 50-kHz USVs after repeated administration. However, rats in all the treatment groups emitted 50-kHz USVs when later re-exposed to the environment previously paired with repeated drug administration, likely indicative of drug-mediated environmental conditioning. Taken together, these results demonstrate the existence of major differences in the acute and long-term effects of different psychoactive drugs on the emission of 50-kHz USVs by rats. Moreover, these results provide a better understanding of the usefulness of 50-kHz USVs as a new tool for the assessment of drug-mediated reward, with implications for the preclinical study of addictive behaviors.

Brief Biography of the Speaker: Nicola Simola received his M.S. Degree in Pharmaceutical Chemistry and Technology and his Ph.D. Degree in Pharmacology of Drug Abuse from the University of Cagliari, Italy. NS currently performs his research activity at the Department of Biomedical Sciences of the University of Cagliari, where he is Assistant Professor of Pharmacology. NS's research involves the study and development of new therapeutic agents for the treatment of Parkinson's disease, focusing on adenosine receptor antagonists and metabolic enhancers, the development of new preclinical models of early-stage Parkinson's disease, and the study of the interactions between caffeine and other recreational psychostimulants bearing addiciton potential. NS's research activity has recently focused on the study of ultrasonic communication in rodents, in an attempt to develop new tools for the study of the rewarding properties of drugs of abuse. NS is author of several articles on caffeine, Parkinson's disease, neurodegeneartion and related topics, published in international journals and scientific books.

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Plenary Lecture 12

Biochemical Signalling Pathways Controlling Biological Responses of Human Myeloid Cells and Their Highly Specific Targeting Using Gold Nanoparticle-Based Biologically Active Conjugates

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Abstract: Human hematopoietic cells of myeloid lineage control crucial normal and pathophysiological reactions of human immune system. They are responsible for recognition of pathogen-associated molecular patterns followed by the inflammatory/innate immune responses to pathogens. Antigen presentation and promotion of lymphocyte-dependent adaptive immunity is also a responsibility of myeloid cells. On the other hand, allergic reactions are induced by the effector cells (mast cells and basophils) which belong to the myeloid lineage. Furthermore, immature myeloid cells could undergo malignant transformation causing acute myeloid leukaemia, which is a serious medical burden all over the world.
Our research demonstrated that all these kinds of responses become possible when the cells are properly adapted to stress caused by these reactions. The process of myeloid cell adaptation to pro-inflammatory/pro-leukaemic stress is controlled by hypoxia-inducible factor 1 (HIF-1) transcription complex which has a number of target genes encoding proteins/enzymes responsible for angiogenesis, glycolysis and cell adhesion.
HIF-1 activation is controlled via differential mechanisms including redox-dependent pathways inhibiting degradation of its alpha subunit by prolyl-hydroxylation, MAP kinase pathways and biosynthetic mechanism (driven by mammalian target of rapamycin – mTOR)
. We are currently using a new approach for highly specific targeting of human myeloid cells by functionalised gold nanoconjugates generated on the basis of citrate-stabilised gold nanoparticles. This allowed delivery of pharmacological inhibitors (rapamycin and ascomycin) into the target cells – human myeloid leukaemia monocytes and primary human basophils. Delivered drugs were capable of inducing the necessary functional effects.

Brief Biography of the Speaker: I obtained my PhD degree in Biochemistry in 1999 in Palladin Institute of Biochemistry NAS of UKraine. Then worked as assistant/associate professor at the Department of Biochemistry, Mechnikoff Odessa National University. In 2001 I obtained a highly competitive Humboldt Research Fellowship and moved to Germany (University of Kaiserslautern). Upon completion of my fellowship I spent three years in Aarhus (Denmark) working as assistant professor at the Interdisciplinary Nanoscience Centre, University of Aarhus. In December 2006 I joined Medway School of Pharmacy as a lecturer in Biochemistry.

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