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Preface

This book contains the proceedings of the 1st WSEAS International Conference on VISUALIZATION, IMAGING and SIMULATION (VIS'08) which was held in Bucharest, Romania, November 7-9, 2008. This conference aims to disseminate the latest research and applications in Imaging Sensors, Biometrics Recognition, Artificial Intelligence for Machine Vision, Visual Navigation, Artificial Intelligence and Symbolic Learning and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from **http://www.wseas.org/reports**. Your feedback encourages the society to go ahead as you can see in **http://www.worldses.org/feedback.htm**

The contents of this Book are also published in the CD-ROM Proceedings of the Conference. Both will be sent to the WSEAS collaborating indices after the conference: **www.worldses.org/indexes**

In addition, papers of this book are permanently available to all the scientific community via the WSEAS E-Library.

Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

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Plenary Lecture I

From Linear to Non-Linear Signal Processing Applied to Mechanical Fault Detection

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Abstract: The early detection of failures in mechanical systems is an important industrial problem which has still to be addressed from both an experimental and theoretical viewpoint.

The detection of the modulating signal is traditionally realised through identification of sidebands in the frequency domain. The short-time Fourier transform is probably the most widely used time-frequency representation. Recently, interest in the use of wavelet transforms for processing non-stationary signals has grown.

The wavelet transforms possess fine time resolution in the high frequency ranges and excellent frequency resolution in low frequency region. However, it is not easy do identify impulsive vibration especially when the SNR of the detected signal is low. In fact, in this condition, the extraction of impulsive features in vibration signals is vital for diagnosing such machines as engines, rolling bearings, gearboxes, etc.

In the last decade, distinguishing deterministic chaos from noise has became an important problem. For this reason, new methods have been developed for quantifying chaos. In particular, methods exist for calculating dimension, Kolmogorov entropy and Lyapunov exponents.

However, in certain cases it is important to distinguish deterministic data from truly random signals. In many cases, the multiresolution analysis, using specific decomposition levels, yields a good separation of sub-bands which are subjected to subsequent chaos analysis.

Specific applications are also presented in order to further evaluate the performance, the effectiveness and the robustness of the main algorithms.

Brief Biography of the Speaker: Vincenzo Niola is professor of Applied Mechanics at Naples University Federico II since 31 march 1987. After he got an Univerisity Degree in Mechanical Engineering, he started in january 1978 didactics activity as helper at course of Applied Mechanics and Machines et as member of their committee of examination. Since september 1979 he carried on that collaboration as owner of a scholarship from C.N.R. (National Research Council). Since december 1981 to march 1987 he was a researcher carrying on the practice course for Applied Mechanics, taking a part at examination meeting and working as proposer in many degree thesis. Since 1981 to 1984 he carried on his didactics activity as university teacher for Bioengineering course of locomotive apparatus at Orthopaedy and Traumathology specialization school of 2th Department of Medicine and Surgery of

Naples University. Since 31 March 1987 is professor of Applied Mechanics at Naples University Federico II, and since A.A. 86/87 to A.A. 92/93 he carried on the Applied Mechanics and Machines course for electronic engineers, and since A.A. 93/94 to today carry on the Applied Mechanics course for computer science engineers. Since A.A. 88/89 to 89/90 he carried on as supply teacher the Applied Mechanics course for building engineers at Salerno Engineering University. By A.A. 94/95 to A.A. 97/98 he carried on as supply professor Tribology course at Naples University Federico II. By A.A. 2001/2002 he holds the chair of Applied Mechanics for University Degree of "Orthopaedic Technician" at 2th Department of Medicine and Surgery of Naples University. Since A.A. 2005/2006 is professor of Tribology and of Complements of Mechanics. During this years Prof. Vincenzo Niola has been the chairman of his courses examination meetings, and was proposer of many degree thesis.. During his activity Prof. Vincenzo Niola was owner of financings from MURST and (in past and present) cooperate scientifically with research corporation and national industries (MERISINTER, MONTEFLUOS, INDESIT, ALENIA, C.I.R.A.). He's scientific member of Naples research unit for PRIN 2003. He's fellow of Italian Association of Theoretical and Applied Mechanics (AIMETA). He's member of IFToMM Linkages on cams committee. He belongs to the International Scientific Committee of the "World Scientific and Engineering Academy and Society (WSEAS). He is President of the WSEAS Italy Chapter on the "Analysis of the Mechanical Systems". He was been Chairman and "invited author" in some session of Internatinal Conferences. He's author of more than 130 national and international papers. Is author of two chapters in the international books. In the past he focused his research activity on :

- Applied Mechanics
- Tribology
- Robot dynamics
- Funicular Railways
- Static and dynamic behaviour of rotors on lubricated journal bearings
- Industrial robot calibration
- Analysis of Mechanical systems by means Wavelet Transform.

The Prof. Niola is member of the "Editorial Board" of two International Journals. He is also Editor-in-Chief of a International Journal.

During these years he has also been speaker of a lot of invited plenary lectures in the International Conferences.

Plenary Lecture II

Advanced Techniques for Vision-based Pedestrian Recognition

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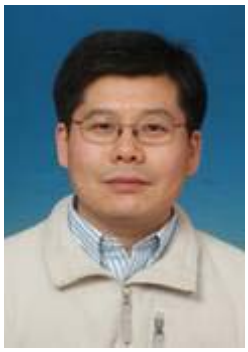
Abstract: In order to improve traffic safety, both the scientific community and the automobile industry have contributed to the development of different types of safety systems. In the last decade, research has also moved towards more intelligent on-board systems that aim to anticipate and try to avoid or mitigate the severity of traffic accidents. These systems are referred to as Advanced Driver Assistance Systems (ADAS). Pedestrian Recognition is currently one of the most interesting ADAS for the automotive industry worldwide. This talk presents advanced techniques for vision-based pedestrian recognition in road images. A comprehensive combination of feature extraction methods is proposed and discussed. The basic components of pedestrians are first located in the image and then combined with SVM-based classifiers. Candidate pedestrians are located using an attention mechanism based on stereo vision. A components-based learning approach is proposed in order to better deal with pedestrians variability, illumination conditions, partial occlusions, and rotations. Extensive comparisons have been carried out using different feature extraction methods, as a key to image understanding in real traffic conditions. A database containing thousands of pedestrian samples extracted from real traffic images has been created for learning purposes, either at daytime and nighttime. The results achieved up to date show interesting conclusions that suggest a combination of feature extraction methods as an essential clue for enhanced detection performance.

Brief Biography of the Speaker: Dr. Miguel Ángel Sotelo obtained his PhD in Telecommunications Engineering in 2001. He is Associate Professor and Vice-Dean of the Polytechnic School at the University of Alcalá (Madrid, Spain), and Head of the Robotics and eSafety Research Group. His research activities are focused on the application of Computer Vision to Intelligent Transportation Systems (ITS), Intelligent Vehicles, and Advanced Driver Assistance Systems (ADAS). Since 2004, he is Expert Evaluator and Auditor of Research and Development projects in the domain of Automotive Applications at FITSA Foundation. He is invited member of several International Societies and Technical Committees, such as the ITS Committee of the IEEE Robotics and Automation Society, the IEEE ITS Society, and ITS-Spain. He is European Commission Representative of the University of Alcalá in the ICT area of the VII Marco Programme. He is author of more than 100 papers in international journals and conference proceedings, and recipient of 10 Research Awards. He has participated as plenary speaker, invited member of the International Program Committee or member of the Technical Committee at several International Conferences. He is member of the Editorial Board of the Open Journal of Transportation and serves as usual reviewer for several prestigious international journals concerning Computer Vision and Intelligent Transportation Systems. He is Associate Editor of IEEE Transactions on Intelligent Transportation Systems.

Plenary Lecture III

Special Purpose Robots



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Abstract: Robotics research in China will be briefly surveyed. Current research in the State Key Laboratory of Robotics of China will be introduced. Then we will focus on several special purpose robots developed at the State Key Laboratory including exploration robots, rescue robots, anti-terror robots, medical robots, and etc. At last, a capsule type robot, named Capsubot, for gastrointestinal track diagnoses will be discussed in detail, including its driving mechanism, design, and control. The Capsubot has no external moving parts. It moves by sliding an internal mass.

Brief Biography of the Speaker: Ph.D. in Engineering Science, Harvard University (USA). He is full professor at Shenyang Institute of Automation, Chinese Academy of Sciences where he is the leader of the Fundamental Research in Robotics Group. He had worked at Tokyo Denki University as Research Associate on Human Adaptive Mechatronics COE project from 2004 to 2007. His main interests include micro robotics, teleoperation, medical robotics, human machine integration, motion description languages, and nonlinear control.

Plenary Lecture IV

Design Certainties by using Uncertainties in Finite Element Design Optimization

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Ayoub Shirvani and Shabnam Sadeghi-Esfahlani

Abstract: Engineers in many industries have been simulating design behavior using traditional methods employing the conventional wisdoms gained from professional practice conducted over many years. In this study an approach is proposed for optimal design of multilevel system under uncertainties. We extend the numerical analysis target to probabilistic design approach by treating stochastic quantities as random variables and parameters and posing reliability-based design restrictions. When used in simulation, once the random variables of boundary conditions, geometry and material properties are specified for a specific analysis case, the input variables are studied simultaneously by using statistical sampling methods. The parametric finite element analysis (FEA) model is then invoked repeatedly, performing deterministic analyses over the resulting input parameters. The case studies assessed in this investigation has shown that effects of different parameters in relation to specific physical properties that have the greatest impact can be evaluated. In this way the probabilistic analysis was used to identify the steps needed for future optimization and that how FE simulation technology can be used to understand production processes uncertainties and related parameter variations in manufacturing process leading to increased product reliability and quality.

Brief Biography of the Speaker: Hassan was awarded his PhD (effective cooling of microelectronic equipment) in 1993 from the University of Bath; where he was employed for 10 years. During September 1996 Hassan joined Then Anglia Ruskin University as a lecturer and during 1997 he was seconded to Rolls Royce aviation through a Royal Academy of Engineering secondment fellowship. In 1998 Hassan returned to Anglia as a senior lecturer and was appointed a reader in collaborative research and Innovation in March 2000. Since 2000 Hassan has continued his research in collaboration with industry and he was appointed a professor of Engineering Design and Simulation in September 2005. Hassan is the Director of Engineering Analysis Simulation & Tribology (EAST) Group and has been responsible for many designs for industry. He has over 50 high impact publications; 2 books and two granted patents. He is a member of ImechE editorial board and in 2002 he was awarded the invention of the year award for his compact heat exchanger design and EEDA's Business/University Collaboration award (2005) for the most entrepreneurial project.