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ROBOTICS, CONTROL AND MANUFACTURING TECHNOLOGY

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Yi Sun, CHINA
Guangzhong Sun, CHINA
Yoshihiro Tanada, JAPAN
Lixin Tao, USA
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Ming-Jer Tsai, TAIWAN
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Hiroshi Umeo, JAPAN
Ronald Yager, USA
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Lusheng Wang, HONG KONG S.A.R.
Lei Wang, CHINA
Zhongfei Wang, CHINA
Hironori Washizaki, JAPAN
Wang Wen, CHINA
Kin Yeung Wong, MACAU S.A.R.
Jyh-Yang Wu, TAIWAN
Hsiaokuang Wu, TAIWAN
Yinshui Xia, CHINA
Yi Xie, CHINA
Xinli Xu, CHINA
Yong Xu, CHINA
Yinlong Xu, CHINA
Xinli Xu, CHINA
Bin Xu, CHINA
Hongwen Yan, CHINA
Hung-Jen Yang, TAIWAN
Thomas Yang, USA
Hung-Jen Yang, TAIWAN
Houjun Yang, CHINA
Hsieh-Hua Yang, CHINA
Wenrong Yang, CHINA
Hung-Jen Yang, TAIWAN
Sumanth Yenduri, USA
Alimujiang Yiming, JAPAN
Jianfei Yin, CHINA
Liuguo Yin, CHINA
Ren Yong Feng, CHINA
Tetsuya Yoshida, JAPAN
Hsiang-fu Yu, TAIWAN
S.Y.Chen, GERMANY
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Kiyun Yu, KOREA
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Chang Nian Zhang, CANADA
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Camelia Ioana Ucenic, ROMANIA
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Preface

This book contains proceedings of the 8th WSEAS International Conference on ROBOTICS, CONTROL and MANUFACTURING TECHNOLOGY (ROCOM '08) which was held in Hangzhou, China, April 6-8, 2008.

We thank the China Jiliang University for the sponsorship . This conference aims to disseminate the latest research and applications in the afore mentioned fields. 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 these 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.

We are sure that this volume will be source of knowledge and inspiration for other academicians, scholars, advisors and industrial practitioners and will be considered as one more brilliant edition of the WSEAS related with a brilliant conference sponsored by China Jiliang University.

Proceedings of the 8th WSEAS International Conference on ROBOTICS, CONTROL and MANUFACTURING TECHNOLOGY (ROCOM '08)

Table of Contents

Plenary Lecture I: Inverse Acoustic and Electromagnetic Obstacle Scattering: Theory and Numerics	12
<i>Jun Zou</i>	
Plenary Lecture II: Fractal Time Series and Tele-Traffic	13
<i>Ming Li</i>	
Plenary Lecture III: Multimedia system – 3d Interactive Model Web (3DIMW)	14
<i>Rong-Jyue Fang</i>	
Plenary Lecture IV: Analytical Synthesis Method:A New Circuit Design Method for Arbitrary Requirements	15
<i>Chun-Ming Chang</i>	
Plenary Lecture V: Real-time In vivo and In situ Cellular Image Processing and Characterization: Challenges and Solutions	16
<i>LIN Feng</i>	
Plenary Lecture VI: Obstacle Avoidance for Kinematically Redundant Manipulators Based on an Improved Problem Formulation and Two Recurrent Neural Networks	17
<i>Jun Wang</i>	
An Lmi Approach to Computation State Feedback Control in the Linear Discrete-Time System with Limited input	19
<i>A.M.Jafari</i>	
Text Region Extraction Algorithm On Steel Making Process	24
<i>Sunghoo Choi , Jong pil Yun, Keunhwi Koo, Jonghyun Choi, Sang woo Kim</i>	
Revisit Controlled Lagrangians for Spherical Inverted Pendulum	29
<i>Guangyu Liu, Subhash Challa, Long-Guang Yu</i>	
Optimal Design of the Linear Delta Robot for Prescribed Cuboid Dexterous Workspace Based on Performance Chart	35
<i>Qiaoling Yuan, Shiming Ji, Zhongfei Wang, Guan Wang, Yuehua Wan and Li Zhan</i>	
Analysis and Research on friction-free cylinder of modal testing suspension system	42
<i>Jianhui Sun, Xiaohang Shan,Xiujun Zhang, Li Zhang,Zhisong Gao,Mingfeng Xie,Qingwu Wang</i>	
Optimal Sliding-mode Control Scheme for the Position Tracking Servo Control System	47
<i>Jiang Jing</i>	

Proportional Integral Sliding Mode Control for the Half-Car Active Suspension System with Hydraulic Actuator	52
<i>YM Sam, NM Suaib and JHS Osman</i>	
Gasbag Polishing Trajectory Planning for Free-form Surface Mould on Machine Vision	58
<i>Shiming Ji, Yindong Zhang, Li Zhang, Mingsheng Jin, Yaqi Sheng</i>	
Integrating UML and GPSS for Business Process Modeling and Simulation	64
<i>Yi Xie</i>	
Research on the Metamorphosis of Dynamic Abrasive Particles Field via Inconsistent Curvature Contact Based on Image Processing	70
<i>Shiming Ji, Yaqi Shen, Li Zhang, Mingsheng Jin, Yindong Zhang</i>	
The Repeatability Analysis of Industrial Robot under Loaded Conditions and Various Distances	75
<i>hmad Rasdan Ismail, Azmi Hassan, Syamimi Syamsuddin, Mohd Zaki Nuawi, Shahrum Abdullah, Hairunnisa Mohamad Ibrahim</i>	
Synthesis of explicit model predictive control system with feasible region shrinking	80
<i>Zhang Ju and Wang Wanliang</i>	
An investigation of temperature effect on microstructure and mechanical properties of aluminum (A360) processed by thixoforging	86
<i>Mohammad kazem Besharaty, Keivan Davami, Mehrdad Shaygan pour</i>	
Electrical Characteristic Modeling and Simulation of PEMFC Based on Least-squares Parameter Estimation	93
<i>Wei Dong, Lu Yong-jun, Chu Lei-min</i>	
An algorithm for polyquadratic stabilization of a multi-inputs multimodel with quantified commands: D-stability approach Application to a drying blower	97
<i>Mongi Besbes, Elyes MaherziI, Mahmoud Ellouze and Radhi Mhiri</i>	
Simultaneous Static Output-Feedback Stabilization for a Collection of Interval Time-Delay Systems via LMI Approach	103
<i>Yuan-Chang Chang, Song-Shyong Chen and Jen-Shu Hsiao</i>	
Kinematics Analysis of a Novel 2-DOF Parallel Fully Decoupled Spherical Mechanism	109
<i>Yunxia Qu , Weimin Li, Anping Xu, Shuncheng Fan</i>	
Research on Mobile Manipulator Tip-over Stability and Compensation	114
<i>Yu-Hong Liu, Xian-Chun Meng, Ming-Lu Zhang</i>	
Study of Collaborative Design System Based on HOOPS/NET	121
<i>Guolin Duan, Xuan Liu, Jin Cai</i>	
Modeling of Solidification Conditions and Melt Treatment on Microporosity Formation	127

K.Davami, M.K.Besharaty

Control-Oriented Approaches to Dynamic Decision Making 138

S.Y. Xu, Z.P. Jiang, L. Huang, D.W. Repperger

About a Differential Equation Characterizing Gas Volume Control 147

Wacker H. D., Boercsoek J.

Verification Skip Writes Head-Positioning Error Mechanism Using Skip Writes Problem Detection 151

Anant Oonsivilai ,Nittaya Meeboon

Pid Control of a Biped Robot 156

Liaquat Ali Khan, Juwairiyah Naeem, Umar Khan, S. Zahid Hussain

Reinforcement Learning for Appearance Based Visual Servoing in Robotic Manipulation 161

Umar Khan, Liaquat Ali Khan, S. Zahid Hussain

Design and Implementation of DC Motor Speed Controller Using Fuzzy- Adaptive Controllers 169

Hengameh Kojooyan Jafari

Fuzzy Inference-Based Control Approach for Thermal- Visual Comfort and Air Quality in Indoor Environments 173

Jean J. Saade, Ali H. Ramadan

PPlenary Lecture I

Inverse Acoustic and Electromagnetic Obstacle Scattering: Theory and Numerics

Professor Jun Zou
Department of Mathematics
The Chinese University of Hong Kong

Abstract: In this talk we shall present some breakthroughs that have been achieved in the past few years on inverse acoustic and electromagnetic obstacle scattering problems. Both theory and numerical simulations will be discussed. This is a joint work with Dr. Hongyu Liu (Washington University, Seattle) and supported by Hong Kong RGC grants (Project 404105 and Project 404606).

Brief Biography of the Speaker: Jun ZOU is a Professor in Department of Mathematics of The Chinese University of Hong Kong. Before taking up his current position in Hong Kong, he had worked two years (93-95) in University of California at Los Angeles (USA) as a post-doctoral fellow and a CAM Assistant Professor, worked two and a half years (91-93) in Technical University of Munich as a Visiting Assistant Professor and an Alexander von Humboldt Research Fellow (Germany), and worked two years (89-91) in Chinese Academy of Sciences (Beijing) as an Assistant Professor. His research areas include numerical solutions of electromagnetic Maxwell systems, interface problems, ill-posed Problems and inverse Problems. He has about 70 publications in the refereed international journals.

Plenary Lecture II

Fractal Time Series and Tele-Traffic



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Personal URL: <http://www.freewebs.com/mingli/>

Abstract: Fractal time series gains applications in various fields of sciences and technologies ranging from financial engineering to network traffic. The speech will describe several models of fractal time series, such as fractional Gaussian noise, the generalized Cauchy process, and so on. Possible applications of fractal time series to networking will be discussed.

Short Biography of the Speaker: Ming Li, Ph.D., is a professor in electronic communications and information systems, as well as computer science at East China Normal University, PR. China. He was with the School of Computing, National University of Singapore, before joining East China Normal University in 2004. His research areas relate to applied statistics and signal processing with the recent interests in fractal time series and time-frequency analysis, computer science currently focusing on network traffic modeling and network security, and measurement & control in the aspects of error analysis and optimal control. He has published over refereed 60 papers in international journals and international conferences in those areas.

Plenary Lecture III

Multimedia system – 3d Interactive Model Web (3DIMW)



Professor Rong-Jyue Fang
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College of Management, STUT,
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Abstract: Based on the functions of theoretical foundations and related literature analysis, study group develop a multimedia system named: 3D Interactive Model Web (3DIMW). The original purpose of research work targeting on constructing a learning platform for three-dimensional computer animation. The feasibility was based on the evaluated functions of 3-D animation techniques and the prototype constructed. Platform derived from three-dimensional computer animation technique associated with ASP.NET and SQL Database. After the completion of platform, consequent procedures were applied to examine the usefulness of it. Graphic science and drawing course was the object comes up with first choice. Later a Turbulence Phenomena simulation and nano sized physical representation showed that it is a good tool for learning complicated image description and maneuvering sophisticated micro-devices.

Brief Biography of the Speaker:Dr. Rong-Jyue Fang – 1984 graduated from The Pennsylvania State University IED Department PhD program. He had been Director of Computation Center, Department Chair of Industrial Technology, and Dean of R&D Office in National Kaohsiung Normal University, later, been a President of National Taitung (East Taiwan) University. In 2005, he moves to Southern Taiwan University of Technology as a Chair Professor. He concentrates his research on multimedia hardware, software, and system development for more than twenty years and gain more than twenty years financial support from Taiwan's National Science Council. In recent years, he works mostly on 3D Interactive Model Web.

Plenary Lecture IV

Analytical Synthesis Method: A New Circuit Design Method for Arbitrary Requirements



Professor Chun-Ming Chang

Senior Member, IEEE

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Abstract: Analytical Synthesis Method (ASM) has been presented in several papers published in the IEEE Transactions on Circuits and Systems since 2003. It is one of the powerful design methods in the field of analog circuit design. It is the method using a succession of innovative algebra manipulation operations to decompose a complicated transfer function representing the relationship between the output and the input signals of a design project into many simple equations feasible by using the corresponding simple sub-circuitries. The simple sub-circuitries can be constructed by the desired configuration of the element such as the single-ended-input operational transconductance amplifiers (OTAs) and the grounded capacitors, both of which are used for absorbing and reducing the shunt parasitic capacitance and lead to have more precise output responses. In addition to this, the ASM can control the number of the terms in the complicated decomposition process such that the number of both active and passive components used in the circuit is the least compared to the previously reported ones. Then, the ASM is the only one method which can simultaneously achieve the three important criteria for the design of OTA-C circuits without trade-offs.

Due to the flexibility of the ASM, the simple sub-circuitries used in the circuit design can be changed and chosen according to different necessities for the target of the circuit design. For example, if the reduction of the number of the active and passive components used in the circuit is more important than the type of the element configurations like single-ended-input/differential-input OTAs and grounded/floating capacitors due to the consideration about power consumption, chip area, noise, and total parasitics....., etc., the minimum component OTA-C circuit can also be investigated and developed successfully using the ASMs. The fully flexible characteristic and the real demonstration in the literature of the ASM may make it be one of the most prospective methods in the field of analog circuit design in the near future..

Plenary Lecture V

Real-time In vivo and In situ Cellular Image Processing and Characterization: Challenges and Solutions



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Abstract: We study the feasibility of 3D virtual histology through real-time in vivo and in situ cellular imaging. A prototype system has been developed based on photodynamic fluorescence signals, confocal endomicroscopy, and FPGA image processing and characterization computing. Experiments in its clinical applications have been conducted, mainly for diagnosis of early-stage mucous cancer. With the fine-grained parallel imaging programs mapped on the FPGA, a stream of focused optical sections of microstructures in the subsurface layers up to 300 μ m in depth, can be processed online and the extracted features can be visualized seamlessly with the endomicroscopy settings.

Brief Biography of the Speaker: Lin Feng, PhD, is an Associate Professor in School of Computer Engineering, Nanyang Technological University, Singapore. His research interests include bioinformatics, bioimaging and visualization, and high-performance computing. He has published about one hundred technical papers in journals, conferences and books, and served in several editorial boards and conference organization committees.

Plenary Lecture VI

Obstacle Avoidance for Kinematically Redundant Manipulators Based on an Improved Problem Formulation and Two Recurrent Neural Networks

Professor Jun Wang

Department of Mechanical and Automation Engineering

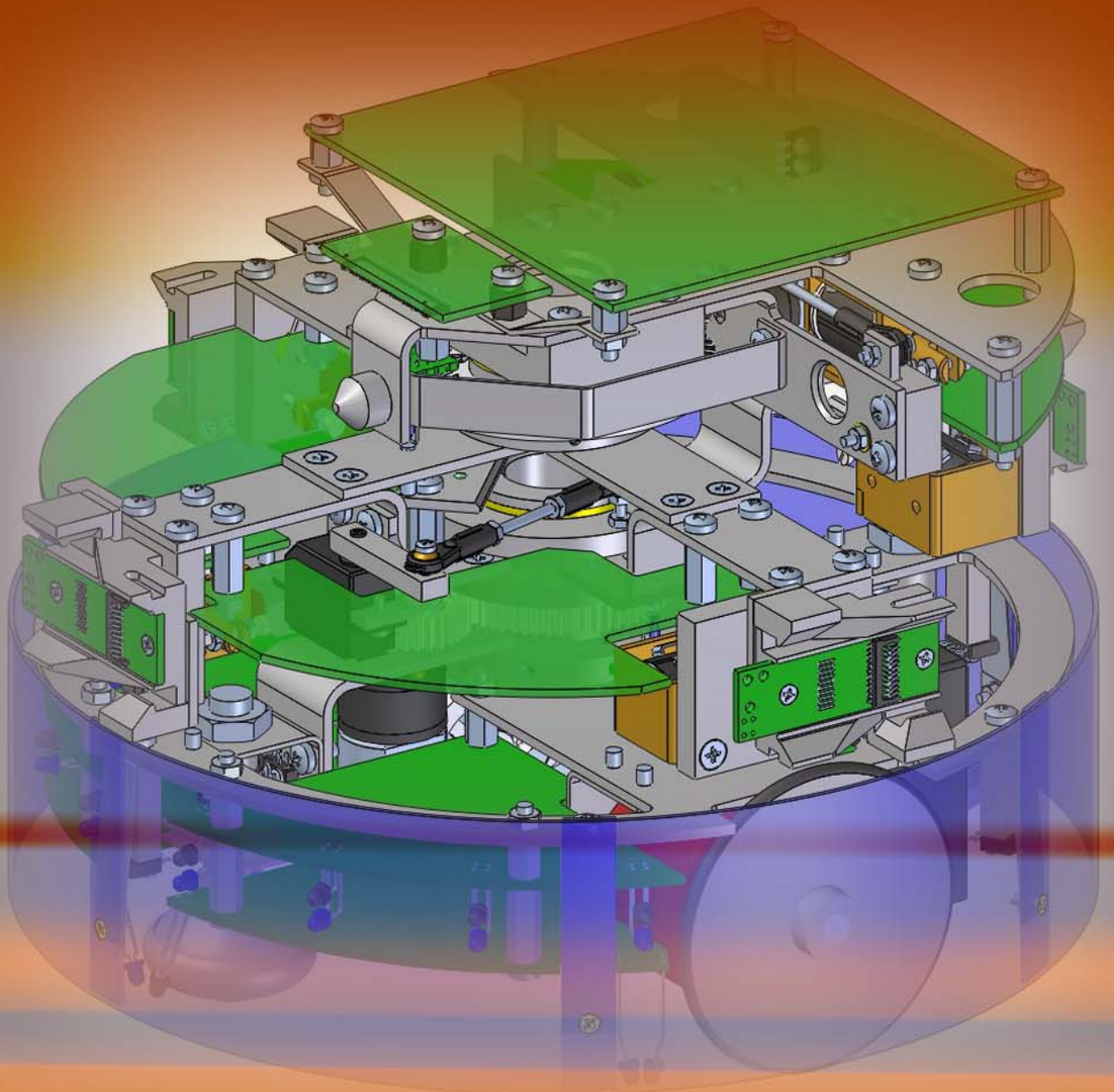
The Chinese University of Hong Kong

Shatin, N.T., Hong Kong

Abstract: With the wide deployment of kinematically redundant manipulators in industrial applications, obstacle avoidance emerges as an important issue to be addressed in robotic motion planning. In this talk, we show the formulation of the inverse kinematic control of redundant manipulators with obstacle avoidance task as a convex quadratic programming problem with both equality and inequality constraints. Compared with our previous formulation, the new problem formulation is more favorable with better solutions or bigger solution set to the problem. To solve this time-varying quadratic programming problem in real time, two recurrent neural networks are applied to compute inverse-kinematic solutions with obstacle avoidance capability in real time. The effectiveness of the proposed approach is demonstrated by using simulation results based on the Mitsubishi PA10-7C

Author Index

Abdullah S.	75	Meng X. C.	114
Ali Khan L.	156, 161	Mhiri R.	97
Besbes M.	97	Naeem J.	156
Besharaty M. K.	86, 127	Nuawi M. Z.	75
Boercsoek J.	147	Oonsivilai A.	151
Cai J.	121	Osman J. H. S.	52
Challa S.	29	Qu Y.	109
Chang Y. C.	103	Ramadan A. H.	173
Chen S. S.	103	Repperger D. W.	138
Choi J.	24	Saade J. J.	173
Choi S.	24	Sam Y. M.	52
Davami K.	86, 127	Shan X.	42
Dong W.	93	Shaygan pour M.	86
Duan G.	121	Sheng Y.	58
Ellouze M.	97	Shiming J.	70
Fan S.	109	Suaib N. M.	52
Gao Z.	42	Sun J.	42
Hassan A.	75	Syamsuddin S.	75
Hsiao J. S.	103	Wacker H. D.	147
Huang L.	138	Wan Y.	35
Hussain S. Z.	156, 161	Wang G.	35
Ibrahim H. M.	75	Wang Q.	42
Ismail A. R.	75	Wang Z.	35
Jafari A. M.	19	Wanliang W.	80
Jafari H. K.	169	Xie M.	42
Ji S.	35, 58	Xie Y.	64
Jiang Z. P.	138	Xu A.	109
Jin M.	58, 70	Xu S. Y.	138
Jing J.	47	Yong-jun L.	93
Ju Z.	80	Yu L.	29
Khan U.	156, 161	Yuan Q.	35
Kim S. W.	24	Yun J. P.	24
Koo K.	24	Zhan L.	35
Lei-min C.	93	Zhang L.	58, 70
Li W.	109	Zhang M. L.	114
Liu .Y. H.	114	Zhang X.	42
Liu G.	29	Zhang Y.	58, 70
Liu X.	121		
Maherzi E.	97		
Meeboon N.	151		



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