The International Association of Science and Technology for Development

Conference Program

The 12th IASTED International Conference on

Intelligent Systems and Control

November 2 – 4, 2009
Cambridge, Massachusetts, USA

SPONSOR

The International Association of Science and Technology for Development (IASTED)

- Technical Committee on Control
- Technical Committee on Intelligent Systems and Control

LOCATION

Le Méridien Cambridge-MIT
20 Sidney Street, Cambridge, MA 02139, USA
Phone: (617) 577-0200

The Twelfth IASTED International Conference on

Intelligent Systems and Control

~ISC 2009~

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CONFERENCE CHAIR

Dr. Mohamed Hamza – IASTED, Canada

PLEASE NOTE

- Paper presentations are 15 minutes in length with an additional 5 minutes for questions.
- Report to your Session Chair 15 minutes before the session is scheduled to begin.
- Presentations should be loaded onto the presentation laptop in the appropriate room prior to your session.
- End times of sessions vary depending on the number of papers scheduled.

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S. Wadoo – New York Institute of Technology, USA
H. Wang – Institute of Automation, Chinese Academy of Sciences, PR China
J. Wang – Bethune-Cookman University, USA
S. G. Wang – University of North Carolina at Charlotte, USA
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P. Kumar – Idaho State University, USA
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PROGRAM OVERVIEW

Monday, November 2, 2009

07:00 – Registration
(Social Foyer)

08:30 – 09:00 Joint TAT, RA & ISC Welcome Address
(Luscomb Ballroom)

09:00 – Session 4B – Identification and Control
(Hunsaker A Room)

10:00 – 10:30 Coffee Break
(Social Foyer)

10:30 – Session 4B Continued

12:30 – Lunch Break
(Self-Catered)

14:00 – TAT Invited Speaker – "Smart Rehabilitation Devices" – Prof. Constantinos Mavroidis
(Luscomb Ballroom)

15:00 – 15:30 Coffee Break
(Social Foyer)

15:30 – Session 1A – Intelligent Data Systems and Computing
(Hunsaker A Room)

Tuesday, November 3, 2009

09:00 – Session 3 – Applications
(*Hunsaker A Room*)

10:00 – 10:30 Coffee Break
(Social Foyer)

10:30 – Session 3 Continued

12:30 – Lunch Break
(Self-Catered)

14:00 – RA Keynote Speaker – "A Retrospective Look at the DARPA Urban Challenge" – Prof. John Leonard
(Luscomb Ballroom)

15:00 – 15:30 Coffee Break
(*Social Foyer*)

15:30 – Session 4A – Systems, Stability, and Optimization
(Hunsaker A Room)

19:30 - Dinner Banquet
(Hunsaker Room)

Wednesday, November 4, 2009

08:30 – TAT Keynote Speaker – "The Importance of Neuromechanical Limb Models in the Design of Leg Prostheses and Orthoses" – Prof. Hugh M. Herr *(Luscomb Ballroom)*

09:30 – Session 2 – Intelligent and Adaptive Control *(Hunsaker A Room)*

10:00 – 10:30 Coffee Break *(Social Foyer)*

10:30 – Session 2 Continued

12:30 – Lunch Break *(Self-Catered)*

14:00 – Session 1B – Data Systems and Applications *(Hunsaker A Room)*

15:00 – 15:30 Coffee Break *(Social Foyer)*

15:30 – Session 1B Continued

Monday, November 2, 2009

07:00 – REGISTRATION
Location: Social Foyer

08:30 – 09:00 – JOINT TAT, RA & ISC WELCOME ADDRESS
Location: Luscomb Ballroom

09:00 – SESSION 4B – IDENTIFICATION AND CONTROL
Chairs: Prof. Tatsuo Narikiyo (Japan) and Asst. Prof. Assimakis Leros (Greece)
Location: Hunsaker A Room

665-094
Estimation of Time-Varying Bias Terms in Linear Systems
A.K. Leros (Greece)

665-013
DCM and Quaternion Partial Matching Methods for Transfer Alignment
T. Kim, Y. Lim, and J. Lyou (Korea)

665-074
Fault Diagnosis of Railway Rolling Bearing based on Wavelet Packet and Elman Neural Network
G. Cai, L. Jia, J. Yang, and D. Yao (PRC)

665-086
Deviation Detection by Self-Organized On-Line Models Simulated on a Feed-Back Controlled DC-Motor
M. Svensson, M. Forsberg, S. Byttner, and T. Rögnvaldsson (Sweden)

665-021
Disturbance Attenuation based on an Observer with a Function of Estimating Unmeasurable Inputs and its Application
T. Narikiyo, K. Fuwa, S. Kadowaki, T. Mori, and H. Kando (Japan)

665-072
Output Feedback for Linear Time-Varying Systems
B. Marinescu (France)

665-092
Function Analysis of a Second Order Sliding Mode Observer for Mechanical Systems
M. Mohamed, B. Safya, and K. Nahla (Tunisia)

665-065
Control of Chaos in a Power-Factor-Correction Boost Converter
A.N. Natsheh (Jordan), J.G. Kettleborough (UK), and G.N. Dheim (Syria)

10:00 – 10:30 – COFFEE BREAK
Location: Social Foyer

10:30 – SESSION 4B CONTINUED

12:30 – LUNCH BREAK
Self-Catered

14:00 – TAT INVITED SPEAKER – "SMART REHABILITATION DEVICES"
Presenter: Prof. Constantinos Mavroidis (USA)
Location: Luscomb Ballroom

Stroke is the third leading cause of death in the United States, with about 730,300 new cases and 160,000 deaths in the United States annually. About 80% of stroke survivors present an early motor deficit, with about 50% having chronic deficits. Loss of mobility due to muscle weakness and spasticity, and thus impaired gait and hemiparesis of the upper limb, are major contributors to post-stroke disability. Novel treatments are needed to serve both as training aids for reestablishing efficient gait patterns and hand functions, and also as assistive devices to address residual motor impairments and functional limitations. During the last ten years, robotics and mechatronics have emerged as new research areas with great relevance to rehabilitation. Robotics and mechatronics offer the promise of sensitive, objective measurements and mobility assistance by using novel computer-controlled active devices. In this talk, three novel rehabilitation robotic devices developed in Prof. Mavroidis' laboratory will be presented. The first is the Robotic Gait Rehabilitation (RGR) Trainer that generates force-fields applied at the patient's pelvic area to facilitate treadmill gait retraining in patients with abnormal gait patterns. The second is a novel, smart and portable Active Knee Rehabilitation Orthotic Device (AKROD) designed to train stroke patients to correct knee hyperextension during stance and stiff-legged gait (defined as reduced knee flexion during swing). The third device is a one degree of freedom (DOF), magnetic resonance imaging (MRI) compatible Variable Resistance Hand Device (VRHD) that was designed for isotonic, isokinetic, and variable resistance grasp and release exercises.

Prof. Constantinos Mavroidis has been a Professor of Mechanical and Industrial Engineering at Northeastern University in Boston, Massachusetts, since July 1, 2006. He has also been a visiting scientist at the Massachusetts General Hospital and Shriners

Hospital for Children in Boston since October 2001. He was an Associate Professor in the same department at Northeastern University from January 1, 2004 to June 30, 2006, an Associate Professor in the Department of Mechanical and Aerospace Engineering at Rutgers University (2001–2004) and an Assistant Professor in the same department (1996–2001). He received a Diploma in Mechanical Engineering from the National Technical University of Athens, Greece, in 1988, and a M.S. and PhD. degrees in Robotics from the University of Paris VI, France, in 1989 and 1993 respectively. From 1993 to 1996 he was a Post-Doctoral Associate at the Department of Mechanical Engineering at the Massachusetts Institute of Technology. Prof. Mavroidis is a Fellow of the ASME and has received numerous prestigious awards, including the 2004 Best of What's New Award in the Personal Health category from the magazine Popular Science for the invention: "Smart Orthotic Device Using Electrorheological Fluids". He has authored and co-authored more than 150 journal and conference papers and book contributions. He is on the Editorial Board of the Journal of NeuroEngineering and Rehabilitation, the Journal of Computational and Theoretical Nanoscience, the journal Bionanotechnology, The Open Nanomedicine Journal and the Journal of Nanotechnology.

15:00 – 15:30 – COFFEE BREAK
Location: Social Foyer

15:30 – SESSION 1A – INTELLIGENT DATA SYSTEMS AND COMPUTING
Chair: Prof. Ming Zhang (USA)
Location: Hunsaker A Room

665-006
Towards Case-based Reasoning for Maritime Anomaly Detection: A Positioning Paper
A. Bergeron Guyard and J. Roy (Canada)

665-056
Time Series Simulation using Ultra High Frequency Cosine and Cosine Higher Order Neural Networks
M. Zhang (USA)

665-062
Aggregated Fuzzy System for Classification of EEG Spectrograms
D. Coufal (Czech Republic)

665-007
A Remote Interrogation of an Inheritance Knowledge Base via E-Mail
N. Ţăndăreanu (Romania)

665-025
A Mobile Agents Approach for Knowledge Bases Processing
N. Tandareanu and C.I. Popirlan (Romania)

665-066
Determining the Number of the Components of Gaussian Mixture Models by Bayesian Hypothesis
K. Fujiwara and S. Watanabe (Japan)

665-045
The Usage of Computer Vision for Identifying Vehicles during their Production Process
F. Mello, L. Schnitman (Brazil), and J.A.M. Felippe de Souza (Portugal)

Tuesday, November 3, 2009

09:00 – SESSION 3 – APPLICATIONS
Chair: Asst. Prof. Muhittin Yilmaz (USA)
Location: Hunsaker A Room

665-032
Generalized Dynamic Inversion Control of F-16 Fighter-Jet Lateral Maneuvering
A.H. Bajodah (Saudi Arabia) and I. Hameduddin (USA)

665-031
Robust Magnetic Attitude Control of Low-Orbit Small Satellite
V. Malyavej, P. Artitthang, and M. Aorpimai (Thailand)

665-059
An Improved Sensor-Less Detector for Loss-of-Synchronism in Stepping Motors
W.-X. Sun and N. Hori (Japan)

665-015
Application of Three-Level Voltage Inverter on FPGA Chip for 3-Phase Induction Motor
V. Tipsuwanporn, W. Sawaengsinkasikit, A. Numsamran, and R. Jaisue (Thailand)

665-040
Linear Matrix Inequality Solution of the Direct Data Domain Approach
M. Yilmaz, N. Yilmazer, H. Liu, and S. Bhumkar (USA)

665-039
Multi-Dimensional Detection Metrics for Automotive Three-Way Catalyst On-Board Diagnostic Monitoring
J.S. Kirschman, K.R. Muske, J.C. Peyton Jones, and J.W. Howse (USA)

665-003
A Look-Ahead Interpolation of Continuous Small Line Segment Contour based on Transition Patterns
X. Liu, S. Wang, and D. Li (PRC)

665-090
Fuzzy Traversability Evaluation for AVG´s
A. Corona, R. Soto, A. Diaz, and J.L. Gordillo (USA)

665-079
The Improvement of Tissue Contour Extraction Method in Medical Image
L. Zheng, G. Li, and Y. Bao (PRC)

10:00 – 10:30 – COFFEE BREAK
Location: Social Foyer

10:30 – SESSION 3 CONTINUED

12:30 – LUNCH BREAK
Self-Catered

14:00 – RA KEYNOTE SPEAKER – "A RETROSPECTIVE LOOK AT THE DARPA URBAN CHALLENGE"
Presenter: Prof. John J. Leonard (USA)
Location: Luscomb Ballroom

This talk will review Team MIT's performance in the 2007 DARPA Urban Challenge (DUC), which was held in October and November 2007, in Victorville, CA. MIT was one of thirty five teams that participated in the DUC national qualifying event (NQE), and was one of eleven teams to qualify for the Urban Challenge final event based on our performance in NQE. Our team was one of six teams to complete the race, finishing in fourth place. We will review the design of our autonomous vehicle, Talos, a Land Rover LR3 equipped with a diverse range of lidar, vision, radar, and navigation sensors connected to a powerful blade cluster computer system. Our vehicle employed novel algorithmic approaches to perception, planning and control for the challenging task of autonomous driving in uncertain, dynamic environments. The performance of our system in the NQE and

race events will be reviewed, and compared with approaches taken by several other teams. Several follow-on research projects arising from our effort will be described.

Joint work with Matt Antone, David Barrett, Mitch Berger, Ryan Buckley, Stefan Campbell, Alexander Epstein, Gaston Fiore, Luke Fletcher, Emilio Frazzoli, Robert Galejs, Jonathan How, Albert Huang, Karl Iagnemma, Troy Jones, Sertac Karaman, Olivier Koch, Siddhartha Krishnamurthy, Yoshi Kuwata, Keoni Maheloni, David Moore, Katy Moyer, Edwin Olson, Steve Peters, Stephen Proulx, Nicholas Roy, Daniela Rus, Chris Sanders, Seth Teller, Justin Teo, Robert Truax, Matthew Walter, and Jonathan Williams.

For more information, see http://grandchallenge.mit.edu.

John J. Leonard is a Professor of Mechanical and Ocean Engineering at MIT and a member of the MIT Computer Science and Artificial Intelligence Laboratory (CSAIL). His research addresses the problems of navigation and mapping for autonomous mobile robots. He holds the degrees of B.S.E.E. in Electrical Engineering and Science from the University of Pennsylvania (1987) and D.Phil. in Engineering Science from the University of Oxford (formally 1994). He studied at Oxford under a Thouron Fellowship and Research Assistantship funded by the ESPRIT program of the European Community. Prof. Leonard joined the MIT faculty in 1996, after five years as a Post-Doctoral Fellow and Research Scientist in the MIT Sea Grant Autonomous Underwater Vehicle (AUV) Laboratory. He has participated in numerous field deployments of AUVs, including under-ice operations in the Arctic and several major experiments in the Mediterranean. He has served an associate editor of the IEEE Journal of Oceanic Engineering and of the IEEE Transactions on Robotics and Automation. He is the recipient of an NSF Career Award (1998), an E.T.S. Walton Visitor Award from Science Foundation Ireland (2004), and the King-Sun Fu Memorial Best Transactions on Robotics Paper Award (2006).

15:00 – 15:30 – COFFEE BREAK
Location: Social Foyer

15:30 – SESSION 4A – SYSTEMS, STABILITY, AND OPTIMIZATION
Chair: Dr. Tadesuke Matsuda (Japan)
Location: Hunsaker A Room

665-070
Development of Parametrical Regulation Theory on the Basis of One Class Computable General Equilibrium Models
A.A. Ashimov, B.T. Sultanov, Zh.M. Adilov, Yu.V. Borovskiy, N.Yu. Borovskiy, and As.A. Ashimov (Republic of Kazakhstan)

665-038
Time Evolution Analysis of Bearing Faults
S.L. Volpi, B. Lazzerini (Italy), and D. Stefanescu (USA)

665-042
Optimal Investments in Clean Technology and Reforestation in the Control of Global Warming using Fuzzy Cost Function
M.A.L. Caetano, D.F.M. Gherardi, T. Yoneyama (Brazil), and J.A.M. Felippe de Souza (Portugal)

665-043
Automatic Buildings Recognition using a 3G Smartphone
C. Vázquez, I. Vertiz, C. Salazar, A. Preciado, J.J. Mendoza, and G. Vertiz (Mexico)

665-067
Real μ-Analysis by Stability Feeler
T. Matsuda, M. Kawanishi, and T. Narikiyo (Japan)

665-068
Real μ-Analysis by Stability Feeler — Estimation of Lower Bounds and Reduction of Conservativeness
T. Matsuda, M. Kawanishi, T. Jennawasin, and T. Narikiyo (Japan)

19:30 – DINNER BANQUET
Location: Hunsaker Room

Wednesday, November 4, 2009

08:30 – TAT KEYNOTE SPEAKER – "THE IMPORTANCE OF NEUROMECHANICAL LIMB MODELS IN THE DESIGN OF LEG PROSTHESES AND ORTHOSES"

Presenter: Prof. Hugh M. Herr (USA)
Location: Luscomb Ballroom

Prof. Hugh Herr is pioneering new research directions for a new class of biohybrid, "smart" prostheses; these devices are accelerating the merging of body and machine, improving the lives of amputees and other physically challenged individuals, and amplifying the endurance and strength of everyone. Herr has employed cross-bridge models of skeletal muscle to the design and optimization of a new class of human-powered mechanisms that amplify endurance for cyclic anaerobic activities. He has also built elastic shoes that increase aerobic endurance in walking and running. In the field of human rehabilitation, Herr's group has developed gait adaptive knee prostheses for transfemoral amputees and variable impedance ankle-foot orthoses for patients suffering from drop foot, a gait pathology caused by stroke, cerebral palsy, and multiple sclerosis. Herr received his BA in physics from Millersville University of Pennsylvania, an MS in mechanical engineering from MIT, and a PhD in biophysics from Harvard University. Prior to coming to the Media Lab, Herr was assistant professor at the Harvard-MIT Division of Health Sciences and Technology and the Department of Physical Medicine and Rehabilitation, Harvard Medical School.

09:30 – SESSION 2 – INTELLIGENT AND ADAPTIVE CONTROL

Chair: Dr. Christophe Collette (Switzerland)
Location: Hunsaker A Room

665-046
Mechanical Systems Position Control by Means of Adaptive Controller with Additional Measurement
P. Strakos and M. Valasek (Czech Republic)

665-078
Active Control of Quadrupole Motion for Future Linear Particle Colliders
C. Collette, K. Artoos, A. Kuzmin, M. Sylte, M. Guinchard, and C. Hauviller (Switzerland)

665-028
Global Stabilization of Full Model of a Human Posture in Space
A.R. Selman (Canada)

665-009
Brachistochrone on a 2D Curved Surface using Optimal Control
M.P. Hennessey and C. Shakiban (USA)

665-087
Robust-Adaptive Flux Observers in Induction Motor Drive Systems
C. Filote, D. Alexa, I.V. Pletea, M. Micea, C. Ciufudean, and A.-M. Cozgarea (Romania)

665-041
Investigating the Use of Fuzzy Logic for Smart Traffic Lights at an Overpass
N. Sangster, P. Persad, and D. Duncan (Trinidad and Tobago)

665-047
Intelligent Control for Wind Turbines with LabVIEW
P. Ponce (Mexico), B. MacCleery, K. Wang (USA), and A. Molina (Mexico)

10:00 – 10:30 – COFFEE BREAK
Location: Social Foyer

10:30 – SESSION 2 CONTINUED

12:30 – LUNCH BREAK
Self-Catered

14:00 – SESSION 1B – DATA SYSTEMS AND APPLICATIONS
Chair: Prof. José A. M. Felippe de Souza (Portugal)
Location: Hunsaker A Room

665-019
Counterfeit Detection by Extracting Rules from Product Traces
L. Wang, N. Oertel, E. Müller, and T. Seidl (Germany)

665-084
Lossless Encoders in Compression of Arrhythmia Signals
D.M. Ballesteros and A.E. Gaona Barrera (Columbia)

665-057
A Novel Approach to Modeling System Dynamics for Control
J.W. Li, X.B. Chen, and W.J. Zhang (Canada)

665-002
A Hybrid Recognition Method for Document Images
Y. Zhang, L. Wu, and S. Wang (PRC)

665-027
Fast Orthogonal Neural Network for Rotation-Translation- and Scale-Invariant Image Recognition
B. Stasiak (Poland)

665-022
Singular Value Decomposition based Particle Filter for Tracking in Complex Environment
Y. Huang and X. Luo (PRC)

665-063
Landmark Extraction using Corner Detection and k-Means Clustering for Autonomous Leader-Follower Caravan
A.B. Nevin and D.M. Bevly (USA)

15:00 – 15:30 – COFFEE BREAK
Location: Social Foyer

15:30 – SESSION 1B CONTINUED

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IASTED would like to thank you for attending ISC 2009. Your participation helped make this international event a success, and we look forward to seeing you at upcoming IASTED events.

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