Proceedings

of the

International Joint Conference on Neural Networks (IJCNN) 2005

July 31 - August 4, 2005

Hilton Montréal Bonaventure Hotel

Montréal, Québec, Canada

Co-organized by:

THE INTERNATIONAL NEURAL NETWORK SOCIETY (INNS)

IEEE COMPUTATIONAL INTELLIGENCE SOCIETY

IJCNN 2005 Conference Proceedings

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IJCNN 2005: SESSION GRID

Sunday, July 31, 2005				
Time	**Lachine**	**Hampstead**	**Mont Royal**	**Verdun**
9:00 a.m.	Evolutionary Robotics		Bioinfomatics and Machine Learning: The Prediction of Protein Structures on a Genomic Scale	
11:00 a.m.	Break			
11:15 a.m.	Neural Networks that Actually Work in Prediction and Decision/Control: Common Misconceptions Versus Real-World Success	Evolving Connectionist Systems for Adaptive Learning and Knowledge Discovery: Principles, Models and Applications	Integrating Language and Cognition: New Results in Computational Intelligence	Feature Extraction in Computational Intelligence
1:15 p.m.	Break			
2:30 p.m.	Neural Networks for Dynamic Systems Feedback	Data Visualization of High Dimensional Scientific Data	New Formulations for Predictive Learning	Unsupervised Learning
4:30 p.m.	Break			
4:45 p.m.	Cognitive Memory	Biologically Plausible Artificial Neural Networks	Support Vector Machines and Kernel Based Learning	Nonlinear Manifolds in Pattern Recognition and Image Analysis
6:45 p.m.	End of the Day			

Monday, August 1, 2005				
Time	**Westmount**	**Outremont**	**Mont Royal/Hampstead**	**Verdun/Lachine**
8:00 a.m.	Plenary: Exploring Chemical Space with Computers: Challenges and Opportunities Professor Pierre Baldi, Director, Institute for Genomics and Bioinformatics, University of California, Irvine			
9:00 a.m.	Break			
9:30 a.m.	Special Session: Neural Networks Applications to Bioinformatics	Information-Theoretic and Bayesian Learning	Special Session: Neurodynamics and Intentional Dynamic Systems	Pattern Recognition
11:30 a.m.	Break			
1:00 p.m.	Bioinformatics	Special Session: Evolvable and Emergent Neural Systems	Models of Neurons, Local Circuits and Systems	Independent Component Analysis and Principal Component Analysis
3:00 p.m.	Break			
3:20 p.m.	Special Session: Computational Neurogenetic Modeling	Control and System Identification	Spiking Neurons	Special Session: Recent Advancements in Adaptive Resonance Theory
5:20 p.m.	Break			
7:00 p.m.	Plenary Poster Session - Fontaine Ballroom			
11:00 p.m.	End of the Day			

Tuesday, August 2, 2005

Time	Westmount	Outremont	Mont Royal/Hampstead	Verdun/Lachine
8:00 a.m.	Functional Organization of the Primate Prefrontal Cortex for Memory Michael Petrides, Professor, Psychology Department/Neurology and Neurosurgery, McGill University and Director, Neuropsychology/Cognitive Neuroscience Unit Montreal, Neurological Institute and Hospital			
9:00 a.m.	Break			
9:30 a.m.	Evolutionary Algorithms and PSO	Special Session: Computational Dynamical Modeling with Echo State Networks	Special Session: Functional Neuroimaging of Cortical and Subcortical Functions	Support Vector Machines I
11:30 a.m.	Break			
1:00 p.m.	Special Session: Applications of Learning and Data-Driven Methods to Earth Sciences and Climate Modeling	Recurrent Neural Networks	Special Session: Transition: Imaging and Cortical Models	Self-Organizing Maps
3:00 p.m.	Break			
3:20 p.m.	Special Session: Applications of Learning and Data-Driven Methods to Earth Sciences and Climate Modeling, Plus Panel Discussion	Diagnostics and Control, Power Systems	Special Session: Models of Cortical and Subcortical Circuits	Visual and Image Processing
5:20 p.m.	Break			
7:00 p.m.	Plenary Poster Session - Fontaine Ballroom			
11:00 p.m.	End of the Day			

Wednesday, August 3, 2005

Time	Westmount	Outremont	Mont Royal/Hampstead	Verdun/Lachine
8:00 a.m.	Plenary: Neural Networks for Feedback Control of Robots and Dynamical Systems Professor Frank L. Lewis, Head, Advanced Controls, Sensors and MEMS Group, Automation and Robotics Research Institute, The University of Texas at Arlington			
9:00 a.m.	Break			
9:30 a.m.	Robotics	Support Vector Machine II	Special Session: Hebb's Legacy	Data Mining
11:30 a.m.	Break			
1:00 p.m.	Hardware	Special Session: Performance of Neuro-Adaptive and Learning Systems: Assessment, Monitoring and Validation	Cognitive Function	Special Session: Constructive/Hierarchical Self-Organizing Maps
3:00 p.m.	Break			
3:20 p.m.	Special Session: Approximate Dynamic Programming	Biomedical Applications	Fuzzy-Neural Systems	Special Session: Biologically Inspired Computational Vision
5:20 p.m.	Break			
7:00 p.m.	Banquet			
9:00 p.m.	End of the Day			

Thursday, August 4, 2005

Time	Westmount	Outremont	Mont Royal/Hampstead	Verdun/Lachine
8:00 a.m.	Plenary: Beyond Correlation – Closing the Loop Between Brain and Theory by Extracting Representations and Altered Feedbacks Professor Mitsuo Kawato, Director, Nara Institute of Science and Technology, ATR Computational Neuroscience Laboratories, Computational Neuroscience Laboratory, Japan			
9:00 a.m.	Break			
9:30 a.m.	Special Session: Neural Prostheses and the Neuron-Silicon Interface	Learning I	Neurodynamics	Applications I
11:30 a.m.	Break			
1:00 p.m.	Neuromorphic Hardware	Learning II	Telecommunications	Applications II
3:00 p.m.	Break			
3:20 p.m.	Plenary: Neuromorphic Engineering: Overview and Potential Professor Carver Mead, Gordon and Betty Moore Professor of Engineering and Applied Science, Emeritus Computation and Neural Systems, Division of Engineering and Applied Science, California Institute of Technology			
4:20 p.m.	End of the Day			

Message from the General Chair

Dear IJCNN 2005 Attendees,

On behalf of the IJCNN 2005 Organizing Committee, I am happy to welcome you to the International Joint Conference on Neural Networks! This year's conference marks another year of fruitful cooperation between the International Neural Network Society (INNS) and the new Computational Intelligence Society (CIS) of the IEEE and continues a legacy of exceptional meetings. For many years the IJCNN has been a "must attend" for all leading neural network researchers, especially those who value interdisciplinary viewpoints. The IJCNN also welcomes other researchers in neuroscience, machine learning, computational intelligence and AI who are undoubtedly attracted by the open-mindedness and the bold spirit of the IJCNN. The IJCNN 2005 is also truly international, with submissions from over 1,500 authors representing 66 countries.

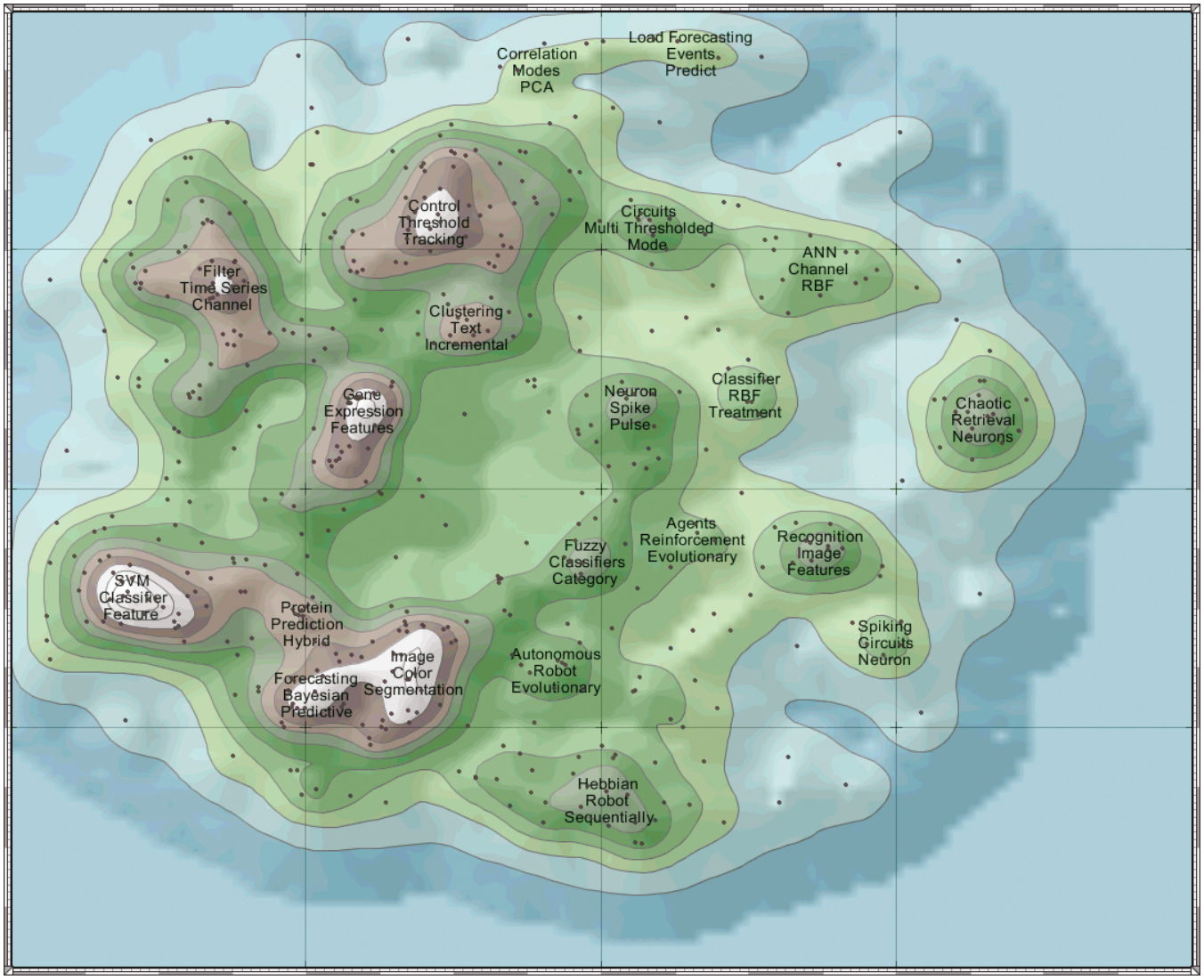
The IJCNN 2005 continues our tradition of quality papers. Our on-line paper collection and review system, expertly created and maintained by Tomasz Cholewo, registered 2,430 reviews from more than 350 reviewers for 752 submitted papers. Moreover, many additional reviews were performed outside of the on-line system. All regular and most of the special session papers received at least three reviews each, which allowed the Program Committee to do a careful job when rejecting 25% of papers. While other conferences may boast higher rejection rates, the high rates do not always guarantee high quality, as those other conferences in the past have accepted papers which could have not made it into the IJCNN Proceedings.

The Organizing Committee worked very hard to create an exciting IJCNN 2005 program. We secured plenary talks from such exceptional speakers as Pierre Baldi, Michael Petrides, Frank Lewis, Mitsuo Kawato and Carver Mead. We scheduled special and regular sessions on the same day to match their plenary talks. Two of our plenary speakers also agreed to give tutorials, complementing an already strong and multidisciplinary tutorial selection. Our 17 special sessions will surely attract your attention.

The IJCNN 2005 landscape is revealed on the next page, with dots representing accepted papers. No differentiation was made in the review and publication processes of papers scheduled for poster or oral presentations. In fact, the majority of the IJCNN 2005 presentations are assembled into two four-hour plenary poster sessions, offering not only plenty of time to present and thoroughly discuss your work with colleagues but also to enjoy the exhibits of our sponsors and the books offered by our invited booksellers. Each poster presentation is much more visible than any of the (just 20-minute!) oral presentations. All poster presenters are in very good company, with several exciting topics appearing only as posters.

We are extremely grateful to the following organizations for their support:

- The INNS (lead society for this year's IJCNN), the IEEE-CIS and their respective leadership.
- Co-sponsors: Florida Institute of Technology, University of Texas at Arlington, Ford Motor Company (the largest donor), ACIL of the University of Missouri-Rolla, Siemens Canada, Cisco Systems and Elsevier.
- Montreal Tourism Bureau.



Effective conference organization is impossible without the right people assigned to appropriate positions. In addition to our International Program and Review Committees listed later, I am especially thankful to the following members of the IJCNN 2005 Organizing Committee:

- Dan Levine, Fred Ham and Bill Howell for their outstanding work on both the conference program and the preparations for the IJCNN Special Issue 18(5/6) of Neural Networks. Bill Howell also helped other members of the Organizing Committee on miscellaneous issues including invitation letters for Canadian visas and special sessions.
- Jean-Philippe Thivièrge, Oury Monchi and Mohamed Cheriet for their solid control of all local arrangement issues including the wireless Internet and coordination of volunteers.
- Mike Stiber (conference home page) and Tom Cholewo (on-line paper submission and review system) were invaluable as our web co-chairs. As in the previous years, Tom and his on-line system saved countless hours for our reviewers, the Program and the Organizing Committees.
- Mary Lou Padgett and Carlo Morabito for their expert handling of all tutorial matters.
- David Brown for his timely publicity efforts.
- Daniel Silver and his International Co-Chairs (Emilio del Moral Hernandez, De-Shuang Huang and Radosveta Sokullu) for their extremely critical work on assuring that our international attendees get their Canadian visas on time.

- Vladimir Cherkassky, Dimitri Solomatine, Vladimir Krasnopolsky and Julio Valdes for their exemplary leadership of the special sessions “Application of Adaptive Learning Methods in Earth Sciences and Climate Modeling.”
- Slawo Wesolkowski for his handling of student travel support.
- Susan Rees, Jane Shepard, Lisa Horton, Amy Bayer, Stacey Phelps, Lisa Gilbertson and other associates at the Rees Group, Inc., for their expert day-to-day efforts on the conference planning and organization.

I also hope that many of you will stay for our post-conference workshops, which is a new element of the IJCNN program to be held in the evening of August 4 and the full day on August 5. The workshops are supposed to provide a more relaxed forum for development of new concepts and themes and expertise sharing. While several workshops have been scheduled already, there is some flexibility to accommodate small groups of interested participants “self-organized” during the main conference. Please let the Organizing Committee know.

While the program we prepared for you is intense, please do not forget to enjoy the beauty and richness of Montréal, which speaks for itself.

Enjoy the conference!

Danil V. Prokhorov
IJCNN 2005 General Chair
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The INNS President's Welcome

Dear IJCNN '05 Participants:

Welcome to the International Joint Conference on Neural Networks! IJCNN is the flagship conference of the INNS, as well as the IEEE Neural Networks Society. It has evolved as rapidly as the technology it explores, while maintaining a core emphasis on neural networks. As the number of conferences has grown, much of its competition has lost this core emphasis. IJCNN, on the other hand, has always welcomed neural networks research contributions, while embracing the proliferation of spin-off and related fields. (See the topic list in these Proceedings.) Neural networks continue to be successfully fielded in applications, many of which are featured here. IJCNN is your premier venue to stay current in this increasingly important field.

An event of this magnitude does not occur spontaneously. We owe a tremendous debt of gratitude to the following:

- The General Chair, Danil Prokhorov, who worked indefatigably to ensure IJCNN's success.
- Dan Levine, the Program Chair. His contributions to INNS date back to its inception (including a stint as INNS President).
- Fred Ham and Bill Howell, Program Co-Chairs. Their efforts on behalf of this meeting have been equally heroic.
- Many other volunteers. Danil Prokhorov will mention more of them in his letter, and we should all join him in gratitude to them.
- Last but not least, a heartfelt thanks to YOU – the reader. Whether you attended the meeting in person, or are just reading these proceedings to enhance your knowledge in the field, IJCNN is for you. We encourage you to read and refer to IJCNN papers frequently in your work, and hope to see you at future IJCNN's.

I'd like to particularly mention two other groups: the IEEE Computational Intelligence Society, and the INNS Board. We have, for many years now, enjoyed a mutually beneficial relationship with the IEEE – enhancing value for members of both societies. The INNS Board should also be thanked and recognized, for its valuable volunteer work on behalf of the society. We particularly welcome newly elected Board members Nik Kasabov and Ron Sun. The full Board list is included in this CD. We're truly blessed to benefit from the wisdom of this extraordinary group of scientists.

The INNS exists to support your interests. It has appointed Robert Kosma as Chair of Special Interest Groups, and provided funding to support SIG activities. INNS also produces the INNS Newsletter, and the journal, *Neural Networks,* which consistently enjoys a strong impact factor among the journals in this field. Be sure to visit www.inns.org to learn more, and to join or renew your membership.

Sincerely,

Donald C. Wunsch II
President, International Neural Network Society
University of Missouri-Rolla, Applied Computational Intelligence Lab

Conference Topics

A. PERCEPTUAL AND MOTOR FUNCTION
A1 Vision and image processing
A2 Pattern recognition
A2a Biometric recognition
A2b Handwriting recognition
A2c Other pattern recognition
A3 Auditory and speech processing
A3a Audition
A3b Speech recognition
A3c Speech production
A4 Other perceptual systems
A5 Motor control and response

B. COGNITIVE FUNCTION
B1 Cognitive information processing
B2 Learning and memory
B3 Spatial navigation
B4 Conditioning, reward and behavior
B5 Mental disorders
B6 Attention and consciousness
B7 Language
B8 Emotion and motivation

C. COMPUTATIONAL NEUROSCIENCE
C1 Models of neurons, local circuits and learning rules
C2 Systems neurobiology and neural modeling
C3 Spiking neurons

D. INFORMATICS
D1 Neuroinformatics and brain models
D2 Bioinformatics
D3 Artificial immune systems
D4 Data mining

E. HARDWARE
E1 Neuromorphic hardware and implementations
E2 Embedded neural networks
E3 Reconfigurable systems

F. NEURODYNAMICS
F1 Recurrent networks
F2 Chaotic systems
F3 K sets theory and applications

G. ADAPTATION AND DECISION MAKING
G1 Reinforcement learning
G2 Approximate dynamic programming, adaptive critics and Markov decision processes
G3 Support vector machines
G4 Advanced learning methods and optimization
G5 Mixture models, EM algorithms and ensemble learning
G6 Radial basis functions
G7 Self-organizing maps and associative memory
G8 Adaptive resonance theory
G9 Principal component analysis and independent component analysis
Ga Probabilistic and information-theoretic methods
Gb Neural networks and evolutionary computation
Gc Fuzzy neural systems
Gd Intelligent agents and swarm intelligence
Ge Quantum and molecular computations

H. APPLICATIONS
H1 Signal processing
H2 Control
H3 Diagnostics and quality control
H4 Robotics
H5 Telecommunication applications
H6 Time series analysis
H7 Biomedical applications
H8 Financial engineering
H9 Biomimetic applications
Ha Computer security applications
Hb Power system applications
Hc Aeroinformatics
Hd Military and security applications
He Other applications

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IEEE Computational Intelligence Society President's Welcome

I am very pleased to welcome all participants of the 2005 International Joint Conference on Neural Networks (IJCNN). Again as in other odd years, this traditional event in 2005 has been organized and sponsored by the International Neural Network Society (INNS), and organized with technical co-sponsorship of the IEEE Computational Intelligence Society (IEEE CIS).

This address offers me a special opportunity to acknowledge the dedicated efforts of the Organizing and Technical Committees and the IJCNN's General Chair, Dr. Danil Prokhorov, who have all worked hard to put together an exciting technical program. The technical sessions will highlight plenary lectures by leading researchers, and will feature regular and special oral sessions. In addition, poster sessions will provide plenty of opportunities for face-to-face interaction between the authors and small groups of participants.

I believe that a conference such as IJCNN offers a unique opportunity for all of us to become one community of professional colleagues regardless of the native language we speak, and regardless of the academic or professional rank we are holding. At IJCNN, aspiring PhD students can rub shoulders with distinguished neural networks pioneers, and junior researchers can freely interact with senior plenary speakers. IJCNN allows us to truly share our research ideas, and meet partners in our present or future research efforts. It is the democracy of research efforts and information exchange that is at work here.

As many of you know, IEEE CIS has a tradition of supporting student travel to its premier conferences such as IJCNN, FUZZ-IEEE, CEC but also to smaller conferences. Similar to previous years, numerous travel grants have been awarded to students from the USA, Canada, and Regions 8-10. To this aim, IEEE CIS has established a special website where all participants can apply for travel subsidies awarded by the IEEE CIS Education Committee. These new participants have my special welcome to Montreal's IJCNN.

CIS is one of thirty-eight IEEE Societies. Its focus is the theory, design, application, and development of biologically and linguistically motivated computational paradigms emphasizing neural networks, connectionist systems, genetic algorithms, evolutionary programming, fuzzy systems, and hybrid intelligent systems. Created in 2002, the Society is actively seeking new members to join its current membership ranks of over 5,700 and expand its international and North-American presence. To join the IEEE CIS and become an active member of our community, please visit www.ieee.org/join.

Activities in all technical areas are coordinated by one of the Society's eight Technical Committees: Computational Intelligence, Fuzzy Systems, Evolutionary Computation, Emergent Technologies, Bioinformatics and Bioengineering, Intelligent Systems Applications, and Autonomous Mental Development. The Committees serve as forums for the exchange of technical information, the dissemination of ideas and the initiation of new topical trends. It is at this level of involvement where ideas and topics are incubated for special sessions of conferences, new workshops and seminars, and special issues of our journals, and also it is where new conferences are being planned.

IEEE CIS offers its members an amazing range of technical involvement. It publishes three highly-regarded IEEE Transactions as well as the CIS Newsletter (that is destined to emerge as the CIS Magazine in 2006), organizes three major conferences and specialized symposia and workshops. The CIS also supports educational opportunities through its multimedia tutorial program, and summer research programs. Other activities include the Distinguished Lecturers Program available to our Chapters, Technical Field Awards, Best Paper Awards, Pioneer Awards, Meritorious Service Award, and new awards such as Outstanding PhD Dissertation Award, and Best Chapter Award. The Society's other efforts extend special opportunities for women in computational intelligence. All of our members are invited to take full advantage of these exciting chances for their professional growth.

New activities can also be initiated within the local territorial entities of our Society called Chapters. To become involved in a Chapter, a member needs to contact the appropriate regional Chapter Chair. If no Chapter has been established in your area, you may create it by collecting twelve signatures of current CIS members and contacting Dr. David Fogel, VP-Membership Activities, at dfogel@natural-selection.com.

Our members are not only encouraged to get involved in Technical Committees or Chapters. The Society also needs more volunteers to run its daily business. We need people for the Standing Committees, such as Education, Multimedia Tutorials, Standards and other committees. In addition, the Society members cast their votes when electing its governing body called Administrative Committee (ADCOM).

As you have read, the Society offers all its members opportunities to get involved, stay active and participate at the technical level or in its self-governance. We need your support, time and talent, and I am eagerly awaiting your participation in the Society, your contribution to the field, and the further advancement of the society as a whole. For more information, please check our website at www.ieee-cis.org.

One of the special conference activities, the Joint IEEE-INNS Awards Banquet and Awards Ceremony, that will be held on Wednesday, August 3, will be co-hosted by the President of the INNS, Dr. Donald Wunsch, and me. I hope to see you all there. I also wish you a pleasant stay in Montreal. Have a great conference!

Dr. Jacek M. Zurada
President, IEEE Computational Intelligence Society
Chairman and S.T. Fife Professor of Electrical and Computer Engineering
University of Louisville, Louisville, Kentucky
Fellow of IEEE, Foreign Member of the Polish Academy of Sciences
j.zurada@ieee.org

GENERAL INFORMATION

Cooperating Societies and Sponsors:

International Neural Network Society
IEEE Computational Intelligence Society
Florida Institute of Technology
University of Texas at Arlington
Ford Motor Company
Applied Computational Intelligence Laboratory, University of Missouri-Rolla
Siemens Canada
CISCO Systems
Elsevier

Registration

Registration for the conference will be open at the following times at the Inscription 1 Registration Desk at the Hilton Montreal Bonaventure Hotel:

Saturday, July 30 . . . . . 5:00 p.m.-8:00 p.m.
Sunday, July 31 . . . . . 7:30 a.m.-5:30 p.m.
Monday, August 1. . . . . 7:30 a.m.-6:30 p.m.
Tuesday, August 2 . . . . . 8:00 a.m.-5:30 p.m.
Wednesday, August 3 . . . . . 8:00 a.m.-5:00 p.m.
Thursday, August 4 . . . . . 8:00 a.m.-5:00 p.m.

Internet Café

The Internet Café is located in the Cote St-Luc Room at the Hilton Montreal Bonaventure Hotel. Both wireless and wired connections will be available for your use. The Internet Café will be open during the following hours:

Sunday, July 31 . . . . . 7:00 a.m.-9:00 p.m.
Monday, August 1. . . . . 7:00 a.m.-9:00 p.m.
Tuesday, August 2 . . . . . 7:00 a.m.-9:00 p.m.
Wednesday, August 3 . . . . . 7:00 a.m.-9:00 p.m.
Thursday, August 4 . . . . . 7:00 a.m.-4:00 p.m.

Speaker Ready Room

The Speaker Ready Room is located in the St-Laurent Room. Please stop by prior to your presentation to preview your slides and run through your presentation. The Speaker Ready Room will be open during the following times:

Saturday, July 30 . . . . . 1:00 p.m.-7:00 p.m.
Sunday, July 31 . . . . . 7:00 a.m.-5:00 p.m.
Monday, August 1. . . . . 7:00 a.m.-5:00 p.m.
Tuesday, August 2 . . . . . 7:00 a.m.-5:00 p.m.
Wednesday, August 3 . . . . . 7:00 a.m.-5:00 p.m.
Thursday, August 4 . . . . . 7:00 a.m.-12:00 noon

Conference Badges

Please wear your badge to all IJCNN 2005 functions. It will admit you to the sessions and the exhibit area.

Plenary Poster Session and Discussions

Posters will be available for viewing in the Fontaine Ballroom at the following times:

Monday, August 1, 2005
1:00 p.m.-11:00 p.m.
(Authors present between 7:00 p.m.-11:00 p.m.)

Tuesday, August 2, 2005
1:00 p.m.-11:00 p.m.
(Authors present between 7:00 p.m.-11:00 p.m.)

Plenary Poster Presenter Schedule

If you are presenting a poster at the meeting, please review the schedule carefully and be sure to assemble and teardown your poster when indicated.

Monday, August 1, 2005

Poster Setup. . . . . 11:00 a.m.-1:00 p.m.
Poster Viewing . . . . . 1:00 p.m.-7:00 p.m.
(Presence of Poster Authors is Optional)

Plenary Poster Session and Discussions
7:00 p.m.-11:00 p.m.
(Presence of Poster Authors is Required)

Poster Teardown . . . . . 11:00 p.m.-12:00 midnight

Tuesday, August 2, 2005

Poster Setup . . . . . 10:00 a.m.-1:00 p.m.
Poster Viewing . . . . . 1:00 p.m.-7:00 p.m.
(Presence of Poster Authors is Optional)

Plenary Poster Session and Discussions
7:00 p.m.-11:00 p.m.
(Presence of Poster Authors is Required)

Poster Teardown . . . . . 11:00 p.m.-12:00 midnight

IJCNN 2005 is not responsible for any posters that are not dismantled by 12:00 midnight each evening.

Exhibits

Plan to spend time in the Fontaine Ballroom visiting with the exhibiting companies at IJCNN 2005. Refreshment breaks and poster sessions will be located in the exhibit area. The exposition will be open at the following times:

Monday, August 1, 2005
11:00 a.m.-5:00 p.m. and 7:00 p.m.-11:00 p.m.
(evening Plenary Poster Session)

Tuesday, August 2, 2005
9:00 a.m.-5:00 p.m. and 7:00 p.m.-11:00 p.m.
(evening Plenary Poster Session)

Wednesday, August 3, 2005
9:00 a.m.-4:00 p.m.

Exhibit Directory

(as of May 24, 2005)

Florida Institute of Technology

College of Engineering
150 West University Boulevard
Melbourne, FL 32901-6975
Tel: +321-674-8020
Fax: +321-674-7270
Email: coe@fit.edu
Website: www.coe.fit.edu

The College of Engineering at Florida Tech includes seven departments that administer multiple engineering and applied science programs. The departments are chemical engineering, civil engineering, computer sciences, electrical and computer engineering, marine and environmental systems, and mechanical and aerospace engineering. Engineering management and systems engineering are graduate programs offered in the department of engineering systems. The College of Engineering supports several research institutes, centers and laboratories including the Information Processing Laboratory (IPL). Researchers in the IPL are actively involved in many computational intelligence research projects; these are federally funded as well as funded projects from industry.

Ford Research and Advanced Engineering

2101 Village Road
Dearborn, MI 48124 USA
Tel: +313-478-2614
Fax: +313-337-5581
Contact (Computational Intelligence):
Danil Prokhorov
Email: dprokhor@ford.com
Website: www.ford.com

Ford Research and Advanced Engineering is one of the world's leading automotive research and engineering organizations engaged in R&D on topics too numerous to list. Ford R & AE will propel Ford Motor Company to world leadership in safe, environmentally responsible and affordable personal mobility through advances in science and technology. Our mission is to ANTICIPATE the technical needs of our customers and the company, INNOVATE solutions to technical challenges, and INCORPORATE developed technology into products and processes. Please come and see some of our exciting new technologies at our IJCNN 2005 booth!

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Developing tools for Obstetrical Decision Support, Risk Management and Clinical Information Systems, LMS Medical is a leader in the application of advanced mathematical modeling and neural networks for medical use.

National Science Foundation

Science of Learning Centers
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Tel: +703-292-5111
Website: www.nsf.gov

The Science of Learning Centers program (SLC) offers awards for large-scale, long-term Centers that will extend the frontiers of knowledge on learning of all types.

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Palisade Corporation is a world leader in quantitative analysis add-ins for Microsoft Excel. The company will be demonstrating its new Neural Networks tool at IJCNN.

University of Missouri-Rolla – ACIL

1870 Mines Circle, 131 EECH
Rolla, MO 65409
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Website: www.ece.umr.edu/acil

ACIL research includes applications of reinforcement and unsupervised learning: TSP, diagnostics, telecommunications networking, smart sensor networks, the game of Go, and more.

University of Texas at Arlington

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Tel: +817-272-1021 (Vice President for Research)
Fax: +817-272-2625

The University of Texas at Arlington (UTA) is a growing research university with over 25,000 students, located in the heart of metropolitan Dallas-Fort Worth. UTA's programs include an Automation and Robotics Research Institute, a Technology Incubator, and neural network researchers in the departments of Psychology, Electrical Engineering, and Computer Science.

Browse Table

Book Title:
Bioinformatics: The Machine Learning Approach, Second Edition
Author(s): Pierre Baldi and Søren Brunak
Price: $60.00

ISBN: 0262-02506-X

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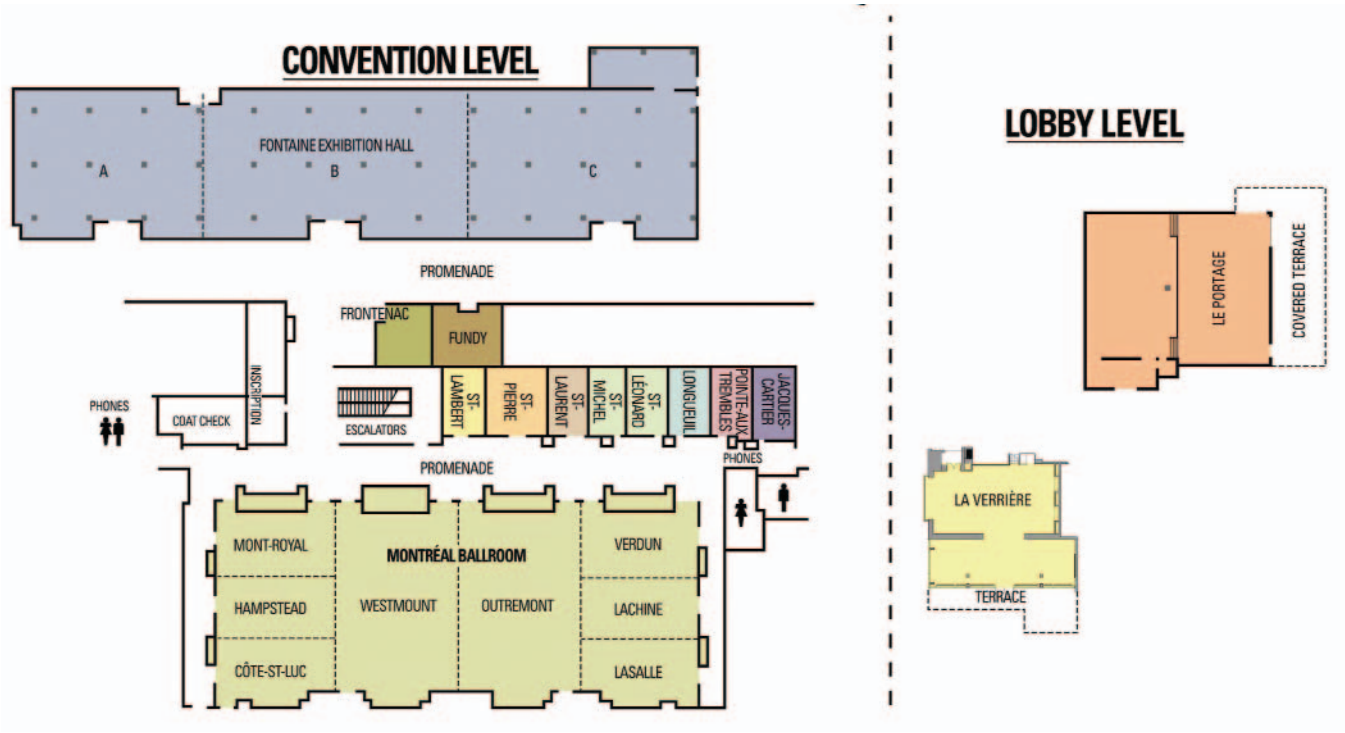
The **College of Engineering** at **Florida Tech** includes seven departments that administer multiple engineering and applied science programs. The departments are chemical engineering, civil engineering, computer sciences, electrical and computer engineering, marine and environmental systems, and mechanical and aerospace engineering. Engineering management and systems engineering are graduate programs offered in the department of engineering systems. The College of Engineering supports several research institutes, centers and laboratories including the Information Processing Laboratory (IPL). Researchers in the IPL are actively involved in many computational intelligence research projects, these are federally funded as well as funded projects from industry.

Hilton Montréal Bonaventure Hotel

Conference Meeting Rooms



IJCNN 2005 Schedule-At-A-Glance

Saturday, July 30, 2005		
1:00 p.m.-7:00 p.m.	Speaker Ready Room	St-Laurent
5:00 p.m.-8:00 p.m.	Registration	Inscription 1

Sunday, July 31, 2005		
7:00 a.m.-9:00 p.m.	Internet Café	Cote St-Luc
7:00 a.m.-5:00 p.m.	Speaker Ready Room	St-Laurent
7:30 a.m.-5:30 p.m.	Registration	Inscription 1
9:00 a.m.-11:00 a.m.	Tutorial T01: Evolutionary Robotics	Lachine
9:00 a.m.-11:00 a.m.	Tutorial T03: Bioinfomatics and Machine Learning: the Prediction of Protein Structures on a Genomic Scale	Mont Royal
9:00 a.m.-11:00 a.m.	Tutorial T04: Cyber Security for Intelligent System Specialists	Hampstead
11:15 a.m.-1:15 p.m.	Tutorial T05: Neural Networks That Actually Work In Prediction and Decision/Control: Common Misconceptions Versus Real-World Success	Lachine
11:15 a.m.-1:15 p.m.	Tutorial T06: Feature Extraction in Computational Intelligence	Verdun
11:15 a.m.-1:15 p.m.	Tutorial T07: Integrating Language and Cognition: New Results in Computational Intelligence	Mont Royal
11:15 a.m.-1:15 p.m.	Tutorial T08: Evolving Connectionist Systems for Adaptive Learning and Knowledge Discovery: Principles, Models and Applications	Hampstead
2:30 p.m.-4:30 p.m.	Tutorial T09: Neural Networks for Dynamic Systems Feedback	Lachine
2:30 p.m.-4:30 p.m.	Tutorial T10: Unsupervised Learning	Verdun
2:30 p.m.-4:30 p.m.	Tutorial T11: New Formulations for Predictive Learning	Mont Royal
2:30 p.m.-4:30 p.m.	Tutorial T12: Data Visualization of High Dimensional Scientific Data	Hampstead
4:45 p.m.-6:45 p.m.	Tutorial T13: Cognitive Memory	Lachine
4:45 p.m.-6:45 p.m.	Tutorial T14: Nonlinear Manifolds in Pattern Recognition and Image Analysis	Verdun
4:45 p.m.-6:45 p.m.	Tutorial T15: Support Vector Machines and Kernel Based Learning	Mont Royal
4:45 p.m.-6:45 p.m.	Tutorial T16: Biologically Plausible Artificial Neural Networks	Hampstead

Monday, August 1, 2005		
7:00 a.m.-9:00 p.m.	Internet Café	Cote St-Luc
7:00 a.m.-5:00 p.m.	Speaker Ready Room	St-Laurent
7:30 a.m.-6:30 p.m.	Registration	Inscription 1
8:00 a.m.-9:00 a.m.	Plenary Session – Pierre Baldi	Westmount
9:00 a.m.-9:30 a.m.	Refreshment Break	Westmount Foyer
9:30 a.m.-11:30 a.m.	Special Session: Neural Networks Applications to Bioinformatics	Westmount
9:30 a.m.-11:30 a.m.	Information-theoretic and Bayesian Learning	Outremont
9:30 a.m.-11:30 a.m.	Special Session: Neurodynamics and Intentional Dynamic System	Mont Royal
9:30 a.m.-11:30 a.m.	Pattern Recognition	Verdun
11:00 a.m.-5:00 p.m.	Exhibits Open	Fontaine Ballroom
11:30 a.m.-1:00 p.m.	Lunch Break (on your own)	
1:00 p.m.-3:00 p.m.	Bioinformatics	Westmount
1:00 p.m.-3:00 p.m.	Special Session: Evolvable and Emergent Neural System	Outremont
1:00 p.m.-3:00 p.m.	Models of Neurons, Local Circuits and Systems	Mont Royal
1:00 p.m.-3:00 p.m.	ICA and PCA	Verdun
3:00 p.m.-3:20 p.m.	Refreshment Break	Fontaine Ballroom
3:20 p.m.-5:20 p.m.	Special Session: Computational Neurogenetic Modeling	Westmount
3:20 p.m.-5:20 p.m.	Control and System Identification	Outremont
3:20 p.m.-5:20 p.m.	Spiking Neurons	Mont Royal
3:20 p.m.-5:20 p.m.	Special Session: Recent Advancements in Adaptive Resonance Theory	Verdun
6:00 p.m.-8:00 p.m.	Student Reception (students welcome, others by invitation)	Portage
7:00 p.m.-11:00 p.m.	Plenary Poster Session	Fontaine Ballroom
7:00 p.m.-11:00 p.m.	Exhibits Open	Fontaine Ballroom

Tuesday, August 2, 2005		
7:00 a.m.-9:00 p.m.	Internet Café	Cote St-Luc
7:00 a.m.-5:00 p.m.	Speaker Ready Room	St-Laurent
8:00 a.m.-5:30 p.m.	Registration	Inscription 1
8:00 a.m.-9:00 a.m.	Plenary Session – Michael Petrides	Westmount

Tuesday, August 2, 2005 - continued

9:00 a.m.-9:30 a.m.	Refreshment Break	Fontaine Ballroom
9:00 a.m.-5:00 p.m.	Exhibits Open	Fontaine Ballroom
9:30 a.m.-11:30 a.m.	Evolutionary Algorithms and PSO	Westmount
9:30 a.m.-11:30 a.m.	Special Session: Computational Dynamical Modeling with Echo State Networks	Outremont
9:30 a.m.-11:30 a.m.	Special Session: Functional Neuroimaging of Cortical and Subcortical Functions	Mont Royal
9:30 a.m.-11:30 a.m.	SVM I	Verdun
11:30 a.m.-1:00 p.m.	Lunch Break (on your own)	
1:00 p.m.-3:00 p.m.	Special Session: Applications of Learning and Data-Driven Methods to Earth Sciences and Climate Modeling	Westmount
1:00 p.m.-3:00 p.m.	Recurrent Neural Networks	Outremont
1:00 p.m.-3:00 p.m.	Special Session: Transition: Imaging and Cortical Models	Mont Royal
1:00 p.m.-3:00 p.m.	Self-Organizing Maps	Verdun
3:00 p.m.-3:20 p.m.	Refreshment Break	Fontaine Ballroom
3:20 p.m.-5:20 p.m.	Special Session Applications of Learning and Data-Driven Methods to Earth Sciences and Climate Modeling, plus Panel Discussion	Westmount
3:20 p.m.-5:20 p.m.	Diagnostics and Control, Power Systems	Outremont
3:20 p.m.-5:20 p.m.	Special Session: Models of Cortical and Subcortical Circuits	Mont Royal
3:20 p.m.-5:20 p.m.	Visual and Image Processing	Verdun
7:00 p.m.-11:00 p.m.	Plenary Poster Session	Fontaine Ballroom
7:00 p.m.-11:00 p.m.	Exhibits Open	Fontaine Ballroom

Wednesday, August 3, 2005

7:00 a.m.-9:00 p.m.	Internet Café	Cote St-Luc
7:00 a.m.-5:00 p.m.	Speaker Ready Room	St-Laurent
8:00 a.m.-5:00 p.m.	Registration	Inscription 1
8:00 a.m.-9:00 a.m.	Plenary Session – Frank Lewis	Westmount
9:00 a.m.-9:30 a.m.	Refreshment Break	Fontaine Ballroom
9:00 a.m.-4:00 p.m.	Exhibits Open	Fontaine Ballroom
9:30 a.m.-11:30 a.m.	Robotics	Westmount
9:30 a.m.-11:30 a.m.	SVM II	Outremont
9:30 a.m.-11:30 a.m.	Special Session: Hebb's Legacy	Mont Royal
9:30 a.m.-11:30 a.m.	Data Mining	Verdun
11:30 a.m.-1:00 p.m.	Lunch Break (on your own)	
1:00 p.m.-3:00 p.m.	Hardware	Westmount
1:00 p.m.-3:00 p.m.	Special Session: Performance of Neuro-Adaptive and Learning Systems: Assessment, Monitoring, and Validation	Outremont
1:00 p.m.-3:00 p.m.	Cognitive Function	Mont Royal
1:00 p.m.-3:00 p.m.	Special Session: Constructive/Hierarchical Self-Organizing Maps	Verdun
3:00 p.m.-3:20 p.m.	Refreshment Break	Fontaine Ballroom
3:20 p.m.-5:20 p.m.	Special Session: Approximate Dynamic Programming	Westmount
3:20 p.m.-5:20 p.m.	Biomedical Applications	Outremont
3:20 p.m.-5:20 p.m.	Fuzzy-Neural Systems	Mont Royal
3:20 p.m.-5:20 p.m.	Special Session: Biologically Inspired Computational Vision	Verdun
7:00 p.m.-9:00 p.m.	Awards Banquet	Westmount

Thursday, August 4, 2005

7:00 a.m.-12:00 noon	Speaker Ready Room	St-Laurent
8:00 a.m.-5:00 p.m.	Registration	Inscription 1
8:00 a.m.-5:00 p.m.	Internet Café	Cote St-Luc
8:00 a.m.-9:00 a.m.	Plenary Session – Mitsuo Kawato	Westmount
9:00 a.m.-9:30 a.m.	Refreshment Break	Westmount Foyer
9:30 a.m.-11:30 a.m.	Special Session: Neural Prostheses and the Neuron-Silicon Interface	Westmount
9:30 a.m.-11:30 a.m.	Learning I	Outremont
9:30 a.m.-11:30 a.m.	Neurodynamics	Mont Royal
9:30 a.m.-11:30 a.m.	Applications I	Verdun
11:30 a.m.-1:00 p.m.	Lunch Break (on your own)	
1:00 p.m.-3:00 p.m.	Neuromorphic Hardware	Westmount
1:00 p.m.-3:00 p.m.	Learning II	Outremont
1:00 p.m.-3:00 p.m.	Telecommunications	Mont Royal
1:00 p.m.-3:00 p.m.	Applications II	Verdun
3:00 p.m.-3:20 p.m.	Refreshment Break	Westmount Foyer
3:20 p.m.-4:20 p.m.	Plenary Session – Carver Mead	Westmount

The IJCNN 2005 Post-Conference Workshops

(as of May 24, 2005)

Workshops are to be held in rooms Fundy, St-Laurent, St-Michel, St-Leonard, Longueuil, Pointe-Aux Trembles and Jacques-Cartier (see near Promenade on the Conference Meeting Rooms page). Individual workshop times may vary. Please consult on-site posters/schedule.

August 4, 7-10PM:

"Artificial Neural Networks, Bioinformatics and Neuroinformatics - A Synergistic Approach"
Organized by: Prof. Nik Kasabov, Knowledge Engineering and Discovery Research Institute, New Zealand, Prof. Amir Assadi, Department of Mathematics, University of Wisconsin, USA.

"Achieving Functional Integration of Diverse Neural Models"
Organized by: Talib S. Hussain, Ph.D., BBN Technologies, Cambridge, MA USA.
Room: St-Leonard.

August 5, 9AM-5PM:

"Verification, Validation and Certification of Neuro-Adaptive Controllers in Safety-Related Areas"
Organized by: Johann Schumann, Ph.D., RIACS/NASA Ames, Pramod Gupta, Ph.D., QSS/NASA Ames, Dragos Margineantu, Ph.D., The Boeing Company, Steven Jacklin, NASA Ames.

"Biologically-Inspired Models and Hardware for Human-like Intelligent Functions"
Organized by: Soo-Young Lee, Director, Brain Science Research Center, KAIST.

"Neurodynamics and Intentional Dynamic Systems"
Organized by: Peter Andras, Newcastle, UK, Ricardo Gutierrez-Osuna, Texas A&M, USA, Walter J Freeman, Berkeley, USA, Robert Kozma, Memphis, USA. Daniel Levine, UTA, USA.

"Computational Intelligence Approaches for the Analysis of Bioinformatics Data: CI-BIO"
Organized by: Francesco Masulli, University of Pisa, Italy, Roberto Tagliaferri, University of Salerno, Italy.

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2006 IEEE World Congress on Computational Intelligence

A Joint Conference of the International Joint Conference on Neural Networks (IJCNN)
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Jun Wang, *THE CHINESE UNIVERSITY OF HONG KONG, CHINA*
Tutorials Chair, WCCI 2006:
DeLiang Wang, *THE OHIO STATE UNIVERSITY, USA*

Sponsored by: IEEE, IEEE COMPUTATIONAL INTELLIGENCE SOCIETY

Co-sponsored by: International Neural Networks Society

Important Due Dates

Special Session Proposal: ***December 31, 2005***
Paper Submission: ***January 31, 2006***
Tutorial Proposal: ***January 31, 2006***
Decision Notification: ***March 15, 2006***
Camera-Ready Submission: ***April 15, 2006***

Call for Contributed Papers

The annual International Joint Conference on Neural Networks (IJCNN 2006) is a premier event in the areas of neural networks. It covers all topics in neural networks, including, but not limited to:

- **supervised, unsupervised & reinforcement learning**
- **neuroinformatics**
- **computational neuroscience**
- **neural dynamics & complex systems**
- **connectionist cognitive science**
- **neural optimization & dynamic programming**
- **kernel methods**
- **graphic models**
- **embedded neural systems**
- **autonomous mental development**
- **neural control & cognitive robotics**
- **hybrid intelligent systems**
- **data analysis & pattern recognition**
- **image & signal processing**
- **hardware implementation**
- **real-world applications**

IJCNN 2006 will be held jointly with the *IEEE Conference on Fuzzy Systems* and the *IEEE Congress on Evolutionary Computation*. Cross-fertilization of the three technical disciplines and newly emerging technologies is strongly encouraged. The Congress will feature world-renowned plenary speakers, state-of-the-art special sessions, themed tutorial workshops, moderated panel discussions, regular technical sessions, poster interactions, and entertaining social functions. All papers are to be submitted electronically through the Congress website. Look for more details at

http://www.wcci2006.org

For general inquiries, contact General Chair Gary Yen at gyen@okstate.edu. For program inquiries, contact Program Chair Lipo Wang at elpwang@ntu.edu.sg.

Call for Special Sessions

IJCNN 2006 Program Committee also solicits proposals for special sessions within the technical scope of the conference. Special sessions are organized by internationally recognized experts and aimed to bring together researchers in a focused topic. Special sessions have become both a tradition and an important component of IJCNN. Papers submitted for special sessions are to be peer-reviewed with the same criteria used for the contributed papers. Researchers interested in organizing a special session are invited to submit a formal proposal to Special Sessions Chair Jun Wang at jwang@acae.cuhk.edu.hk. Special session proposal should include the session title, a brief description of the scope and motivation, names, contact information and brief CV of the organizers.

Call for Tutorials

WCCI 2006 will feature a number of pre-congress tutorials covering fundamental and advanced computational intelligence topics. Tutorial proposals, submitted to Tutorials Chair via emails, are solicited and should include title, outline, expected enrollment, and presenter biography. Any inquires regarding the tutorials should address to Tutorial Chair DeLiang Wang at dwang@cse.ohio-state.edu.

CALL FOR PAPERS

www.wcci2006.org

2006 IEEE World Congress on Computational Intelligence

A Joint Conference of the International Joint Conference on Neural Networks (IJCNN)
IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)
and IEEE Congress on Evolutionary Computation (CEC)

July 16-21, 2006
Sheraton Vancouver Wall Centre, Vancouver, BC, Canada

2006 IEEE International Conference on Fuzzy Systems

General Chair, WCCI 2006:
Gary G. Yen, *OKLAHOMA STATE UNIVERSITY, USA*
Program Chair, FUZZ-IEEE 2006:
Piero Bonissone, *GENERAL ELECTRIC GLOBAL RESEARCH, USA*
Technical Co-Chairs, FUZZ-IEEE 2006:
Hisao Ishibuchi, *OSAKA PREFECTURE UNIVERSITY, JAPAN*
Jim Keller, *UNIVERSITY OF MISSOURI-COLUMBIA, USA*
Rudolf Kruse, *UNIVERSITY OF MAGDEBURG, GERMANY*
Nikhil R. Pal, *INDIAN STATISTICAL INSTITUTE, INDIA*
Special Sessions Chair, FUZZ-IEEE 2006:
Tsu-Tian Lee, *NATIONAL TAIPEI UNIVERSITY OF TECHNOLOGY, TAIWAN*
Tutorials Chair, WCCI 2006:
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Call for Contributed Papers

The annual IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2006) is a premier event in the areas of fuzzy systems. It covers all topics in fuzzy systems, including, but not limited to:

- **fuzzy logics & fuzzy set theory**
- **fuzzy-neuro-evolutionary hybrids**
- **fuzzy optimization & design**
- **fuzzy system architectures & hardware**
- **fuzzy pattern recognition & image processing**
- **fuzzy control & robotics**
- **fuzzy data mining & forecasting**
- **fuzzy information retrieval**
- **fuzzy human interface**
- **fuzzy internet & multimedia**
- **fuzzy computing with words**
- **granular computing**
- **real-world applications**

FUZZ-IEEE 2006 will be held jointly with the *International Joint Conference on Neural Networks* and the *IEEE Congress on Evolutionary Computation* as a part of the 2006 IEEE World Congress on Computational Intelligence. Cross-fertilization of the three technical disciplines and newly emerging technologies is strongly encouraged. The Congress will feature world-renowned plenary speakers, state-of-the-art special sessions, themed tutorial workshops, moderated panel discussions, regular technical sessions, poster interactions, and entertaining social functions. All papers are to be submitted electronically through the Congress website. Look for more details at

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For general inquiries, contact General Chair Gary Yen at gyen@okstate.edu. For program inquiries, contact Program Chair Piero Bonissone at bonissone@research.ge.com.

Call for Special Sessions

FUZZ-IEEE 2006 Program Committee also solicits proposals for special sessions within the technical scope of the conference. Special sessions are organized by internationally recognized experts and aimed to bring together researchers in a focused topic. Special sessions have become both a tradition and an important component of FUZZ-IEEE. Papers submitted for special sessions are to be peer-reviewed with the same criteria used for the contributed papers. Researchers interested in organizing a special session are invited to submit a formal proposal to Special Sessions Chair Tsu-Tian Lee at president@ntut.edu.tw. Special session proposal should include the session title, a brief description of the scope and motivation, names, contact information and brief CV of the organizers.

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2006 IEEE Congress on Evolutionary Computation

General Chair, WCCI 2006:
Gary G. Yen, *OKLAHOMA STATE UNIVERSITY, USA*
Program Chair, CEC 2006:
Simon M. Lucas, *UNIVERSITY OF ESSEX, UK*
Technical Co-Chairs, CEC 2006:
Gary B. Fogel, *NATURAL SELECTION, INC., USA*
Graham Kendall, *UNIVERSITY OF NOTTINGHAM, UK*
Ralf Salomon, *UNIVERSITY OF ROSTOCK, GERMANY*
Byoung-Tak Zhang, *SEOUL NATIONAL UNIVERSITY, KOREA*
Special Sessions Chair, CEC 2006:
Carlos A. Coello Coello, *CINVESTAV-IPN, MEXICO*
Tutorials Chair, WCCI 2006:
DeLiang Wang, *THE OHIO STATE UNIVERSITY, USA*

Sponsored by: IEEE, IEEE Computational Intelligence Society

Co-sponsored by: EPS Evolutionary Programming Society

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Call for Contributed Papers

The annual IEEE Congress on Evolutionary Computation (CEC 2006) is a premier event in the areas of evolutionary computation. It covers all topics in evolutionary computation, including, but not limited to:

- **theory of evolutionary computation**
- **representation and operators**
- **combinatorial & numerical optimization**
- **coevolution & collective behavior**
- **multiobjective evolutionary algorithms**
- **evolutionary design**
- **evolvable hardware**
- **evolvable software**
- **evolving neural networks & fuzzy systems**
- **evolving learning systems**
- **evolutionary intelligent agents**
- **developmental systems**
- **molecular & quantum computing**
- **bioinformatics & bioengineering**
- **ant colonies & immune systems**
- **particle swarm & differential evolution**
- **real-world applications**

CEC 2006 will be held jointly with the *International Joint Conference on Neural Networks* and the *IEEE Conference on Fuzzy Systems*. Cross-fertilization of the three technical disciplines and newly emerging technologies is strongly encouraged. The Congress will feature world-renowned plenary speakers, state-of-the-art special sessions, themed tutorial workshops, moderated panel discussions, regular technical sessions, poster interactions, and entertaining social functions. All papers are to be submitted electronically through the Congress website. Look for more details at

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For general inquiries, contact General Chair Gary Yen at gyen@okstate.edu. For program inquiries, contact Program Chair Simon M. Lucas at sml@essex.ac.uk.

Call for Special Sessions

CEC 2006 Program Committee also solicits proposals for special sessions within the technical scope of the conference. Special sessions are organized by internationally recognized experts and aimed to bring together researchers in a focused topic. Special sessions have become both a tradition and an important component of CEC. Papers submitted for special sessions are to be peer-reviewed with the same criteria used for the contributed papers. Researchers interested in organizing a special session are invited to submit a formal proposal to Special Sessions Chair Carlos A. Coello Coello at ccoello@cs.cinvestav.mx. Special session proposal should include the session title, a brief description of the scope and motivation, names, contact information and brief CV of the organizers.

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