ICES 2008 PROGRAM

Welcome to the 8th International Conference on Evolvable Systems: From Biology to Hardware – ICES 2008. Over the years the field of Evolvable Systems has itself "evolved" to encompass everything from Adaptive Hardware Systems to Evolvable Hardware Design.

For the 2008 ICES we have grouped technical presentations together by area as well as having a "Best Paper" session in which you, the attendees, will be given ballots to vote for the Best Paper.

We hope you enjoy these presentations, along with the tutorials, discussion forum, invited speakers, ...

sincerely,
Greg Hornby, General Chair
Lukáš Sekanina, Program Co-Chair
Pauline Haddow, Program Co-Chair
Giovanni Squillero, Publicity Chair
Milena Zeithamlová, Local Organiser

SEPTEMBER 21, 2008 – Sunday

10:00 – 11:30	**Tutorial 1**
	Evolvable Hardware Systems towards Real-World Applications: From Dream to Reality *Tatiana Kalganova (Brunel University, UK)*
11:30 – 13:00	**Lunch Break (on your own)**
13:00 – 14:30	**Tutorial 2**
	Overcoming Premature Convergence with the Age-Layered Population Structure (ALPS) *Greg Hornby (UC Santa Cruz/NASA Ames, USA)*
14:30 – 14:50	**Coffee Break**
14:50 – 16:20	**Tutorial 3**
	Evolution in Materio *Julian F. Miller (University of York, UK)*
16:20 – 16:40	**Coffee Break**
16:40 – 18:00	**Discussion Forum** ***Moderator**: Andy Greensted (University of York, UK)*

SEPTEMBER 22, 2008 – Monday

09:00 - 09:15	**Official Opening**
09:15 - 10:15	**Keynote Talk** ***Chair:** Greg Hornby (UC Santa Cruz/NASA Ames, USA)*
	Progress in Reconfigurable Microfluidic Systems for Evolvable BioChips *Richard B. Fair (Duke University, USA)*
10:15 - 10:20	**Short Break**
10:20 – 11:10	**SESSION M1: Evolution of Analog Circuits** ***Chair:** Lukáš Sekanina (Brno University of Technology, Czech Republic)*
10:20 – 10:45	**Unconstrained Evolution of Analogue Computational "QR" Circuit with Oscillating Length Representation** *Yerbol Sapargaliyev, Tatiana G. Kalganova (Brunel University, UK)*
10:45 – 11:10	**ISCLEs: Importance Sampled Circuit Learning Ensembles for Trustworthy Analog Circuit Topology Synthesis** *Peng Gao (K.U. Leuven), Trent McConaghy (Solido Design Automation Inc., Canada), Georges Gielen (K.U. Leuven, Belgium)*
11:10 – 11:30	**Coffee Break**
11:30 - 12:20	**SESSION M2: Evolution of Digital Circuits** ***Chair:** Gunnar Tufte (Norwegian University of Science and Technology)*
11:30 - 11:55	**A Comparison of Evolvable Hardware Architectures for Classification Tasks** *Kyrre Glette, Jim Torresen (University of Oslo, Norway), Paul Kaufmann, Marco Platzner (University of Paderborn, Germany)*
11:55 - 12:20	**Hardware Acceleration of an Immune Network Inspired Evolutionary Algorithm for Medical Diagnosis** *Stephen L. Smith, Andrew Greensted, Jon Timmis (University of York, UK)*

12:20 - 14:00	**Lunch Break**
14:00 - 15:40	**SESSION M3:** **Hardware-Software Codesign and Platforms for Adaptive Systems** ***Chair:*** *Jim Torresen (University of Oslo, Norway)*
14:00 - 14:25	**Evolutionary Graph Models with Dynamic Topologies on the Ubichip** *Juan Camilo Peña (UPB, Medellin, Colombia), Jorge Peña (UNIL, Lausanne), Andrés Upegui (HES-SO/HEIG-VD, Yverdon, Switzerland)*
14:25 - 14:50	**A Hardware-Software Design Framework for Distributed Cellular Computing** *Pierre-André Mudry, Julien Ruffin, Michel Ganguin (EPFL Lausanne, Switzerland), Gianluca Tempesti (University of York, UK)*
14:50 - 15:15	**Hardware/Software Co-Synthesis of Distributed Embedded Systems Using Genetic Programming** *Stanislaw Deniziak, Adam Gorski (Cracow University of Technology)*
15:15 - 15:40	**Self-Adaptive Networked Entities for Building Pervasive Computing Architectures** *Martin Daněk (UTIA AV, Czech Republic), Jean-Marc Philippe (CEA LIST, France), Petr Honzík (UTIA AV, Czech Republic), Christian Gamrat (CEA LIST, France), Roman Bartosinski (UTIA AV, Czech Republic)*
15:40 - 16:00	**Coffee Break**
16:00 - 17:40	**SESSION M4: Best Paper Award Competition** ***Chair:*** *Julian F. Miller (University of York, UK)*
16:00 - 16:25	**Cellular Automata-Based Development of Combinational and Polymorphic Circuits** *Michal Bidlo, Zdeněk Vašíček (Brno University of Technology, Czech Republic)*
16:25 – 16:50	**Investigating the Suitability of FPAAs for Evolved Hardware Spiking Neural Networks** *Patrick Rocke, Brian McGinley, John Maher, Fearghal Morgan (NUI Galway, Ireland), Jim Harkin (University of Ulster, Northern Ireland)*
16:50 - 17:15	**The Segmental-Transmission-Line: Its Design and Prototype Evaluation** *Moritoshi Yasunaga, Yoshiki Yamaguchi, Hiroshi Nakayama (University of Tsukuba, Japan), Ikuo Yoshihara, Naoki Koizumi (Miyazaki University, Japan), Jung H. Kim (University of Arkansas, USA)*
17:15 - 17:40	**On Evolutionary Synthesis of Linear Transforms in FPGA** *Zdeněk Vašíček, Martin Žádník, Lukáš Sekanina, Jiří Tobola (Brno University of Technology, Czech Republic)*
17:45 - 19:00	**Poster Session, Late Breaking Papers** ***Chair:*** *Stephen L. Smith (University of York, UK)*
	Optimised State Assignment for FSMs Using Quantum Inspired Evolutionary Algorithm *Marcos Paulo Mello Araujo, Nadia Nedjah, Luiza de Macedo Mourelle (State University of Rio de Janeiro, Brazil)*
	Evolvable Hardware: A Tool for Reverse Engineering of Biological Systems *Pauline C. Haddow* *(Norwegian University of Science and Technology, Norway)*
	Coevolution of Neuro-developmental Programs that Play Checkers *Gul Muhammad Khan, Julian F. Miller, David M. Halliday (University of York, UK)*

	Hippocampus-Inspired Spiking Neural Network on FPGA *Maizura Mokhtar, David M. Halliday, Andy M. Tyrrell (University of York, UK)*
	Fault-Tolerant Memory Design and Partitioning Issues in Embryonics *Lucian Prodan, Mihai Udrescu, Mircea Vladutiu (Universitatea Politehnica din Timisoara, Romania)*
	The Input Pattern Order Problem: Evolution of Combinatorial and Sequential Circuits in Hardware *Martin Trefzer, Tuze Kuyucu, Andy Greensted, Julian F. Miller, Andy M. Tyrrell (University of York, UK)*
	Neural Development on the Ubichip by Means of Dynamic Routing Mechanisms *Andrés Upegui, Andrés Perez-Uribe, Yann Thoma, Eduardo Sanchez (REDS - HEIG-VD, Switzerland)*
	The Perplexus Programming Framework: Combining Bio-Inspiration and Agent-Oriented Programming for the Simulation of Large Scale Complex Systems *Olivier Brousse, Gilles Sassatelli, Thierry Gil, Michel Robert (LIRMM, Univ. Montpellier 2, France), Francois Grize (UNIL, Switzerland), Eduardo Sanchez, Andrés Upegui, Yann Thoma (HEIG-VD, Switzerland)*
	Quantum Bio-inspired Vision Model on System-on-a-Chip (SoC) *Chu Kiong Loo, Teh Joo Peng (Multimedia University, Malaysia)*
	Evolutionary Meta Compilation: Evolving Programs using Real World Engineering Tools *Jamie Cullen (University of New South Wales, Australia)*
	Waveguide Synthesis by Genetic Algorithms With Multiple Crossover *Jana Jilková, Zbyněk Raida (Brno University of Technology, Czech Republic)*
	Parallel Grammatical Evolution for Circuit Optimization *Ondřej Popelka (Mendel University of Agriculture and Forestry), Pavel Ošmera (Brno University of Technology, Czech Republic)*
	Self-organization of Bio-inspired Integrated Circuits *André Stauffer, Joel Rossier (EPFL, Switzerland)*
	Artificial Creativity in Linguistics Using Evolvable Fuzzy Neural Networks *Keith Douglas Stuart (Polytechnic University of Valencia), Maciej Majewski (Koszalin University of Technology, Poland)*
	Late-Breaking Papers
	Evolvable Assembly Systems: Latest Developments *M. Onori, Antonio Maffei (KTH, Sweden), J. Barata Oliveira (Universidade Nova de Lisboa, Portugal)*
	Cognitive Antenna Systems *Ligia Chira Cremene, Nicolae Crisan, Tudor Palade (Technical University of Cluj-Napoca, Romania)*
19:30	**Welcome Reception** **Olymp Hall – Top Floor of the Olympik Hotel**

SEPTEMBER 23, 2008 – Tuesday

09:00 - 10:00	**Keynote Talk** ***Chair:*** *Greg Hornby (UC Santa Cruz/NASA Ames, USA)*
	A New Approach to Machine Embryogenesis *Jordan Pollack (Brandeis University, USA)*
10:00 - 10:05	**Short Break**
10:05 - 10:55	**SESSION T1: Evolutionary Robotics** ***Chair:*** *Moritoshi Yasunaga (University of Tsukuba, Japan)*
10:05 - 10:30	**Towards Efficient Evolutionary Design of Autonomous Robots** *Peter Krčah (Charles University, Czech Republic)*
10:30 - 10:55	**Indirect Online Evolution - a Conceptual Framework for Adaptation in Industrial Robotic Systems** *Marcus Furuholmen (Aker Subsea AS, Norway), Kyrre Glette, Jim Torresen, Mats Hovin (University of Oslo, Norway)*
10:55 - 11:15	**Coffee Break**
11:15 - 12:30	**SESSION T2: Development** ***Chair:*** *Lucian Prodan ("Politehnica" University of Timisoara, Romania)*
11:15 - 11:40	**A Developmental Gene Regulation Network for Constructing Electronic Circuits** *Song Zhan, Julian F. Miller, Andy M. Tyrrell (University of York, UK)*
11:40 - 12:05	**Discovery and Investigation of Inherent Scalability in Developmental Genomes** *Gunnar Tufte (Norwegian University of Science and Technology, Norway)*
12:05 - 12:30	**Learning General Solutions through Multiple Evaluations during Development** *Tuan-Hao Hoang (University of New South Wales, Australia), Bob McKay (Seoul National University, Korea), Daryl Essam (University of New South Wales, Australia), Xuan Hoai Nguyen (Seoul National University, Korea)*
12:30 - 14:00	**Lunch Break**
14:00 - 15:00	**Panel Debate: Real Challenges in Evolvable Hardware** ***Moderator:*** *Andy M. Tyrrell (University of York, UK)* ***Panelists****: Jordan Pollack (Brandeis University), Gunnar Tufte (Norwegian University of Science and Technology), Trent McConaghy (Solido Design Automation Inc. / K.U. Leuven) and Otto Fučík (Brno University of Technology, Camea, spol. s r.o.)*
	What are the recurrent challenges in the field? What are the important next steps for the field? What is next generation evolvable hardware? Will there be a next generation of evolvable hardware? What are you views? We welcome your active participation to ensure that this is an interesting and exciting event!
15:20	**Meeting Point by Registration Desk**

15:30 - 23:00	**Excursion to Troja Château,** **followed by Vltava River Boat Cruse** **& Conference Dinner at Velká Klášterní Restaurace** Strahovské nádvoří 302 Prague 1

SEPTEMBER 24, 2008 – Wednesday

09:00 - 10:00	**Keynote Talk** ***Chair:*** *Greg Hornby (UC Santa Cruz/NASA Ames, USA)*
	Postneodarwinistic Theories of Biological Evolution - From Selfish Gene to Frozen Evolution *Jaroslav Flegr (Charles University in Prague, Czech Republic)*
10:00 - 10:05	**Short Break**
10:05 - 10:55	**SESSION W1: Real-World Applications** ***Chair:*** *Tetsuya Higuchi (National Institute of Advanced Industrial Science and Technology, Japan)*
10:05 - 10:30	**Evolving MEMS Resonator Designs for Fabrication** *Gregory S. Hornby (U.C. Santa Cruz/NASA Ames), William F. Kraus, Jason D. Lohn (Carnegie Mellon University, USA)*
10:30 - 10:55	**Self-Reconfigurable Mixed-Signal Integrated Circuits Architecture comprising a Field Programmable Analog Array and a General Purpose Genetic Algorithm IP core** *Didier Keymeulen, Adrian Stoica, Ricardo Zebulum (JPL, Caltech), Srinivas Katkoori, Pradeep Fernando, Hariharan Sankaran (University of South Florida, USA), Mohammad Mojarradi, Taher Daud (JPL, Caltech, USA)*
10:55 - 11:15	**Coffee Break**
11:15 – 12:30	**SESSION W2: Evolutionary Networking** ***Chair:*** *Richard Růžička (Brno University of Technology, Czech Republic)*
11:15 - 11:40	**Proposal for an LDPC Code Design System Using Multi-Objective Optimization and FPGA-based Emulation** *Yukari Ishida, Hirotaka Nosato (Toho University, Japan), Eiichi Takahashi, Masahiro Murakawa, Isamu Kajitani (National Institute of Advanced Industrial Science and Technology, Japan), Tatsumi Furuya (Toho University, Japan), Tetsuya Higuch (National Institute of Advanced Industrial Science and Technology, Japan)*
11:40 - 12:05	**Scalability of a Novel Shifting Balance Theory-based Optimization Algorithm: A Comparative Study on a Cluster-based Wireless Sensor Network** *Erfu Yang, Nick H. Barton, Tughrul Arslan, Ahmet T. Erdogan (The University of Edinburgh, UK)*
12:05 - 12:30	**Evolutionary Design of Fault Tolerant Collective Communications** *Jiří Jaroš (Brno University of Technology, Czech Republic)*
12:30 - 14:00	**Lunch Break**

14:00 – 16:05	**SESSION W3:** **Evolvable Artificial Neural Networks and Transistor-Level Circuit Evolution** ***Chair:** Andy M. Tyrrell (University of York, UK)*
14:00 - 14:25	**A Cellular Structure for Online Routing of Digital Spiking Neuron Axons and Dendrites on FPGAs** *Hooman Shayani, Peter Bentley (University College London, UK), Andy M. Tyrrell (UCL, University of York, UK)*
14:25 - 14:50	**Bio-inspired Event Coded Configurable Analog Circuit Block** *Thomas Jacob Koickal, Luiz Carlos Gouveia, Alister Hamilton (University of Edinburgh, UK)*
14:50 - 15:15	**Dynamics of Firing Patterns in Evolvable Hierarchically Organized Neural Networks** *Olga Chibirova, Javier Iglesias, Vladyslav Shaposhnyk, Alessandro E.P. Villa (Universite Joseph Fourier, France)*
15:15 - 15:40	**Evolving Variability-tolerant CMOS Designs** *James Alfred Walker, James A. Hilder, Andy M. Tyrrell (University of York, UK)*
15:40 - 16:05	**Transistor-level Evolution of Digital Circuits Using a Special Circuit Simulator** *Luděk Žaloudek, Lukáš Sekanina (Brno University of Technology, Czech Republic)*
16:05 - 16:15	**Closing**

For Presenters

Presenters are kindly asked to contact the appropriate session chair, set up and test the presentation before their session starts.

Best Paper Award Competition

Four papers are nominated for the Best Paper Award.
These papers will be presented on Monday 16:00 – 17:40.
The ballot paper is in your conference bag. Please vote for your favorite paper, in terms of content AND oral presentation and deliver it to the Registration Desk no later than Tuesday 11:15 am.
The winner will be announced at Tuesday´s conference dinner.

ACKNOWLEDGMENTS

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