



CONFERENCE PROGRAM

June 25 - 29, 2005
L'Enfant Plaza Hotel
Washington, D.C., USA

A recombination of the 10th Genetic Programming Conference and
the 14th International Conference on Genetic Algorithms

sponsored by the
Association for Computing Machinery
Special Interest Group for Genetic and Evolutionary Computation

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Support for Student Travel Grants

We gratefully acknowledge and thank the GECCO Student Travel Grant Program donors:



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Science is in our nature.



Welcome

Welcome to Washington D.C. and GECCO-05.

On January 1, 2005, the former International Society for Genetic and Evolutionary Computation became the Association for Computing Machinery Special Interest Group for Genetic and Evolutionary Computation (**ACM SIGEVO** www.sigevo.org). We welcome this transition because of the many advantages ACM affiliation brings. In particular, inclusion of the GECCO 2005 proceedings in the ACM Digital Library will increase the profile of GECCO publications and their authors.

Greet old friends and meet new ones at the **Opening Reception** on Sunday, 18:30 – 19:30 in the Grand Ballroom. The reception is free to all registered GECCO attendees. Remember to bring your badge and the drink ticket included with your registration package. Your badge is your admission ticket. An assortment of hot and cold appetizers, wine, and soft drinks will be served. Redeem your drink ticket at the reception.

Plan to attend the plenary sessions with our Keynote Speakers. **Professor Drew Endy** will introduce us to synthetic biology - an engineering approach realized with wetware. **Dr. Joshua M. Epstein** will discuss social systems. (Monday and Tuesday, 8:00 to 10:00 in the Grand Ballroom)

Results of a survey of the Evolutionary Computation community will be presented during a lunch session, on Tuesday in the Grand Ballroom. The survey was designed to help the community understand trends in our field, and help Evolutionary Computation graduates find jobs in the community.

Instructions for Technical Session Presenters

- Speakers in the technical sessions are allocated **30 minutes** for each presentation.
- Speakers in the Late Breaking Papers sessions are allocated **15 minutes** for each presentation. The last scheduled speaker in an LBP session is asked to chair the session.
- Speakers in Tuesday's Evolutionary Computing in Practice (ECP) session during lunch are allocated **20 minutes** for each presentation.
- Allotted presentation time includes equipment set up, presentation, and questions period.
- Poster presenters may set up their posters on Tuesday from 14:00 to 17:00.

If a session is without a chair, we ask the last scheduled speaker to perform those duties.

Instructions for Session Chairs

- Keep the session on schedule:

Please adhere to the scheduled order of talks, as well as presentation times. If a speaker is absent, we ask you to announce a short break until the next presentation is due to start. Do not start early, as participants may be moving between sessions/presentations.

- Introduce each speaker
- Moderate questions
- Arrive a few minutes early to check on room and equipment set-up. Please let conference organizers know immediately if problems arise or adjustments are needed.

Exhibits

Exhibits from Wiley and Springer are located in the Grand Ballroom Foyer. Please support those who support us.

Conference Chair: Una-May O'Reilly, CSAIL, MIT

Editor-in-Chief: Hans-Georg Beyer

Workshops and Late Breaking Papers Chair: Franz Rothlauf

Competitions Chair: Simon Lucas

Business Committee: David E. Goldberg
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Riccardo Poli

Local Arrangements Co-Chairs: R. Paul Wiegand, Ronald W. Morrison

Graduate Student Workshop Chair: Michael O'Neill

Undergraduate Student Workshop Chair: Laurence D. Merkle

Evolutionary Computation in Practice Chairs: Cem Baydar, Accenture and Tina Yu, Chevron

Track Chairs:

Artificial Life, Evolutionary Robotics and Adaptive Behavior: Hod Lipson

Ant Colony Optimization and Swarm Intelligence: Christian Blum

Artificial Immune Systems: Dipankar Dasgupta

Biological Applications: James A. Foster, Wolfgang Banzhaf

Coevolution: Edwin de Jong

Estimation of Distribution Algorithms: Martin Pelikan

Evolutionary Combinatorial Optimization: Gunther Raidl

Evolutionary Multiobjective Optimization: Kalyanmoy Deb, Eckart Zitzler

Evolutionary Strategies, Evolutionary Programming: Dirk Arnold

Evolvable Hardware: Andy Tyrrell

Genetic Algorithms: Erick Cantu-Paz

Genetic Programming: Terry Soule

Learning Classifier Systems and Other Genetics-Based Machine Learning: Xavier Llorà

Meta-heuristics and Local Search: Jean-Paul Watson

Real World Applications: Eric Bonabeau

Search-based Software Engineering: Spiros Mancoridis

SIGEVO Officers:

Chair: Erik Goodman

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Treasurer: Wolfgang Banzhaf

American Association for Artificial Intelligence Conference Management Services: Colleen Boyce, Carol Hamilton, Thomas Preuss, Ann Stolberg

Special thanks: the Staff at the Association for Computing Machinery, Pat Cattolico, Tia Fulmer at The Printing House Inc., Lisa Tolles of Sheridan Press, Gerardo Valencia

Program Committee

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John Bullinaria	Luis Gonzalez	Taras Kowaliw	Stefano Nolfi	Michele Sebag	Annie S. Wu
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Jian-Hung Chen	Walter Gutjahr	Marco Laumanns	Robert Ouellette	Don Sofge	
		Paul Layzell			

Generative Social Science: Applications of Agent-Based Computational Modeling

Agent-based modeling is expanding rapidly in fields as diverse as economics, epidemiology, archaeology, and political science.

The approach is fundamentally changing the very notion of an explanation in the social sciences: from a "top down" Nash equilibrium rational choice concept to a "bottom up" one in which one generates social phenomena of interest in distributed populations of locally interacting agents. Epstein will present applications to smallpox containment, civil violence, and organizational adaptation.

Biography

Joshua M. Epstein is a Senior Fellow in Economic Studies at the Brookings Institution, a member of the Brookings-Johns Hopkins Joint Center on Social and Economic Dynamics, and a member of the External Faculty of the Santa Fe Institute.

He holds a Ph.D. in Political Science from MIT and is a member of the New York Academy of Sciences. He is also a member of the Editorial Boards of the journal *Complexity*, and of the Princeton University Press *Studies in Complexity* book series.

His primary research interest is in the modeling of complex social, economic, and biological systems using agent-based computational models and nonlinear dynamical systems. He has taught computational and mathematical modeling at Princeton and the Santa Fe Institute Summer School.

He has published widely in the modeling area, including recent articles on the dynamics of civil violence, the demography of the Anasazi (both in the *Proceedings of the National Academy of Sciences*) and the epidemiology of smallpox (in the *American Journal of Epidemiology*). His two most recent books are: *Growing Artificial Societies: Social Science from the Bottom Up*, with co-author Robert Axtell, (MIT Press, 1996); and *Nonlinear Dynamics, Mathematical Biology, and Social Science* (Addison-Wesley/Santa Fe Institute, 1997). His book, *Generative Social Science: Studies in Agent-Based Computational Modeling*, is forthcoming from Princeton University Press.

Engineering Biological Systems

Biology is going through a fundamental transition – from preexisting, natural, and evolving systems, to synthetic, engineered, and disposable systems.

Here, I will discuss (i) our ‘refactoring’ of a natural biological system, bacteriophage T7, (ii) the adaptation and application of three past lessons – standardization, abstraction, and decoupling – that seem relevant to the engineering of biology today, (iii) how solving the problems of error detection and correction in reproducing machines might lead to interesting compromises in system architecture, and (iv) some of the social, political, and risk opportunities and pitfalls worth considering as we begin to systematically engineer the living world.

Biography

Drew Endy (<http://mit.edu/indy/>) studied civil, environmental, and biochemical engineering at Lehigh University and Thayer School, Dartmouth College.

From 1998 through 2001 he helped to start the Molecular Sciences Institute, an independent not-for-profit biological research lab in Berkeley, CA. In 2002, he started a group as a fellow in the Department of Biology and the Biological Engineering Division at MIT; he joined the MIT faculty in 2004. Endy co-founded the MIT Synthetic Biology working group and the Registry of Standard Biological Parts, and organized the First International Conference on Synthetic Biology.

Endy and colleagues taught the 2003 and 2004 MIT Synthetic Biology labs organized the 2004 Synthetic Biology competition, a five-school course that enabled students to work together to design and build engineered biological systems, and are now organizing the 2005 Intercollegiate Genetically Engineered Machine (iGEM) competition.

Endy's research focuses on the engineering of integrated biological systems and error detection in reproducing machines.

Best Paper Nominees

As part of the double-blind peer review, the papers listed below were nominated for a best paper award. Your ballot to elect the best papers is part of your registration package.

Papers compete in different categories, according to the track to which they were submitted (e.g., GA papers compete only against other GA papers). Please **vote for at most one paper in each category** and place your ballot in the box at the registration desk **by 18:00 on Tuesday June 28**.

Winners will be announced on Wednesday during the plenary session, 8:30 – 10:00 in the Grand Ballroom.

Artificial Life, Evolutionary Robotics and Adaptive Behavior:

Optimization with Constraints using a Cultured Differential Evolution Approach

Ricardo Landa Becerra, Carlos Coello Coello

A Study of Evolutionary Robustness in Stochastically Tiled Polyominoes.

Daniel A Ashlock, Justin Schonfeld

Constructing Good Learners using Evolved Pattern Generators

Vinod Valsalam, James Bednar, Risto Miikkulainen

Artificial Immune Systems

An Artificial Immune Network for Multimodal Function Optimization on Dynamic Environments

Fabricio Olivetti de Franca, Fernando J. Von Zuben, Leandro Nunes de Castro

Discriminating and Visualizing Anomalies Using Negative Selection and Self-Organizing Maps

Fabio A González, Juan Carlos Galeano, Diego Alexander Rojas, Angélica Veloz-Suan

Sufficiency Verification of HIV-1 Pathogenesis based on Multi-Agent Simulation

Zaiyi Guo, Hann Kwang Han, Joc Cing Tay

Biological Applications

A Hybrid Genetic Algorithm with Pattern Search for Finding Heavy Atoms in Protein Crystals

Joshua L. Payne, Margaret J. Eppstein

Particle Swarm Optimization for Analysis of Mass Spectral Serum Profiles

Habtom Resson, Rency S Varghese, Daniel Saha, Eduard Orovisky, Lenka Goldman, Emanuel F Petricoin, Thomas P Conrads, Timothy D Veenstra, Mohamed Abdel-Hamid, Christopher A Loffredo

A GA for Maximum Likelihood Phylogenetic Inference using Neighbour-Joining as a Genotype to Phenotype Mapping

Leon Poladian

Coevolution

Co-Evolving Recurrent Neurons Learn Deep Memory POMDPs
Faustino Gomez, Juergen Schmidhuber

Monotonic Solution Concepts in Coevolution
Sevan G. Ficici

Understanding Cooperative Co-evolutionary Dynamics via Simple Fitness Landscapes
Elena Popovici, Kenneth De Jong

Combination of:

Ant Colony Optimization and Swarm Intelligence, Evolutionary Multiobjective Optimization, Meta-heuristics and Local Search

BeeAdHoc - An Energy Efficient Routing Algorithm for Mobile Ad Hoc Networks Inspired by Bee Behavior
Horst F. Wedde, Muddassar Farooq, Thorsten Pannenbaecker, Bjoern Vogel, Christian Mueller, Johannes Meth, Rene Jeruschkat

Minimum Spanning Trees Made Easier Via Multi-Objective Optimization
Frank Neumann, Ingo Wegener

The Enhanced Evolutionary Tabu Search and Its Application to the Quadratic Assignment Problem
John F McLoughlin III, Walter Cedeno

Evolutionary Combinatorial Optimization

Evolutionary Algorithms for the Self-Organized Evolution of Networks
Katharina A Lehmann, Michael Kaufmann

On the Analysis of the Approximation Capability of Simple Evolutionary Algorithms for Scheduling Problems
Christian Gunia

Best Paper Nominees

Estimation of Distribution Algorithms

Sub-Structural Niching in Estimation of Distribution Algorithms

Kumara Sastry, Hussein A. Abbass, David E. Goldberg, D. D. Johnson

Extracted Global Structure Makes Local Building Block Processing Effective in XCS

Martin V. Butz, Martin Pelikan, Xavier Llorà, David E. Goldberg

Not All Linear Functions Are Equally Difficult for the Compact Genetic Algorithm

Stefan Droste

Evolutionary Strategies, Evolutionary Programming

Theoretical Analysis of a Mutation-Based Evolutionary Algorithm for a Tracking Problem in the Lattice

Thomas Jansen, Ulf Schellbach

On the Impact of Objective Function Transformations on Evolutionary and Black-Box Algorithms

Tobias Storch

Rigorous Runtime Analysis of a $(\mu+1)$ -ES for the Sphere function

Carsten Witt, Jens Jägersküpper

Genetic Algorithms

Measuring Mobility and the Performance of Global Search Algorithms

Monte Lunacek, Darrell Whitley, James N. Knight

Memory-Based Immigrants for Genetic Algorithms in Dynamic Environments

Shengxiang Yang

On Favoring Positive Correlations between Form and Quality of Candidate Solutions via the Emergence of Genomic Self-Similarity

Ivan I Garibay, Annie S Wu, Ozlem O Garibay

On the Complexity of Hierarchical Problem Solving

Edwin D. de Jong, Richard A. Watson, Dirk Thierens

Improving GA Search Reliability Using Maximal Hyper-Rectangle Analysis

Chongshan Zhang, Khaled Rasheed

On the Stationary Distribution of GAs with Fixed Crossover Probability

U. C. de Silva, J. Suzuki

Genetic Programming

Finding Needles in Haystacks is Harder with Neutrality.

M Collins

Open-ended Robust Design of Analog Filters Using Genetic Programming

Jianjun Hu, Xiwei Zhong, Erik Goodman

Learning Classifier Systems

A First Order Logic Classifier System

Drew Mellor

Modeling Systems with Internal State using Evolino

Daan Wierstra, Faustino Gomez, Juergen Schmidhuber

Kernel-based, Ellipsoidal Conditions in the Real-Valued XCS Classifier System

Martin V. Butz

Real World Applications

Learning Basic Navigation for Personal Satellite Assistant Using Neuroevolution

Yiu Fai Sit, Risto Miikkulainen

Mission Planning for Joint Suppression of Enemy Air Defenses Using a Genetic Algorithm

Jeffrey P Ridder, Jason C HandUber

Genetic Algorithms for the Sailor Assignment Problem

Deon Garrett, Dipankar Dasgupta, Joseph Vannucci, Rodrigo Silva, James Simien

Map-labelling with a Multi-objective Evolutionary Algorithm

Lucas Bradstreet, Luigi Barone, Lyndon While

Search-based Software Engineering

Stress Testing Real-Time Systems with Genetic Algorithms

Lionel C. Briand, Yvan Labiche, Marwa Shousha

Evolutionary Testing of State-Based Programs

Phil McMinn, Mike Holcombe



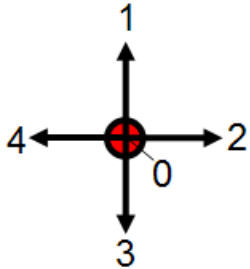
Thank you to Toyota Technical Center, USA, Inc. for sponsoring the awards plaques.

Competitions

Competition winners will be announced on Wednesday during the plenary session, 8:30 – 10:00, in the Grand Ballroom.

The winner of each competition receives a certificate and a small cash prize. In the event that a competition has fewer than three entrants by the closing date, the competition will be cancelled.

Physical Traveling Salesperson Problem (PTSP)



The challenge of the PTSP competition is to minimize the number of time steps taken to visit all the cities in the competition map.

The objective now is to minimize the number of time steps taken to visit all the cities.

The winning criteria for the this competition are:

- Must visit all cities
- Minimum number of vectors used (= string length)
- Minimum number of non-zero forces used
- Time submitted (given solutions of equal quality, the earliest submission wins)

Developmental Systems

The challenge of this competition is to provide a novel demonstration of an evolved developmental system. The demonstration should consist of a 2 minute video or software run showing your system grow an interesting artifact.

Entrants attend the SEEDS Workshop and make a short presentation and demonstration of their system. Judging will be done subjectively by an expert panel, and the workshop audience.

The main judging criteria are as follows:

- Novelty
- Mathematical elegance and simplicity
- New formalism
- Regenerative ability (damage repair)
- Biological plausibility (not essential)
- Lifecycle (can your system grow seeds for the next generation..)
- Applications (does it solve some problem better than a non-developmental system?)
- Artistic merit - wow factor
- Emergence
- Evolvability

Evolutionary Computation in Practice

For the past three years, GECCO included a track on Evolutionary Computation in Industry (ECI), which contained presentations useful to managers, technology scouts, and other individuals interested in assessing the potentials of evolutionary algorithms to solve their industrial problems.

This year, the track is renamed as Evolutionary Computation in Practice (ECP) to reflect the change that our presentations have been extended to include military applications and topics related to technology transfer from academia to industry.

Results of a survey of the Evolutionary Computation community will be presented during the ECP lunch session on Tuesday, in the Grand Ballroom.

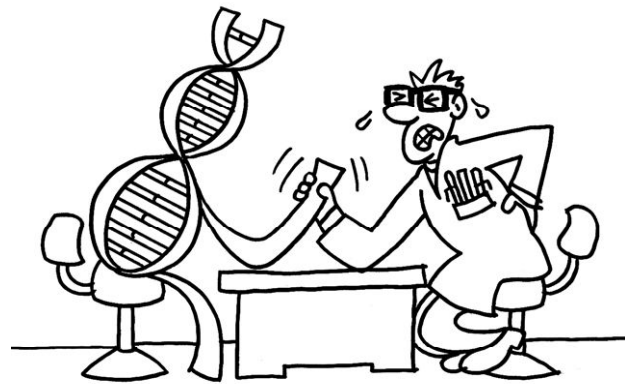
Hummiies

Prizes Totaling \$10,000 to be Awarded for Human-Competitive Results

Techniques of genetic and evolutionary computation are being increasingly applied to difficult real-world problems—often yielding results that are not merely interesting and impressive, but competitive with the work of creative and inventive humans.

At the Genetic and Evolutionary Computation Conference (GECCO) in Seattle, June 2004, \$5,000 in awards for human-competitive results were given for six human-competitive results produced by some form of genetic and evolutionary computation in the previous year.

This year, in a special technical session, Hummie finalists will give short oral presentations about human-competitive results that they have produced by any form of genetic and evolutionary computation (e.g., genetic algorithms, genetic programming, evolution strategies, evolutionary programming, learning classifier systems, grammatical evolution, etc.).



An automatically created result is “human-competitive” if it satisfies at least one of the eight criteria below.

- The result was patented as an invention in the past, is an improvement over a patented invention, or would qualify today as a patentable new invention.
- The result is equal to or better than a result that was accepted as a new scientific result at the time when it was published in a peer-reviewed scientific journal.
- The result is equal to or better than a result that was placed into a database or archive of results maintained by an internationally recognized panel of scientific experts.
- The result is publishable in its own right as a new scientific result independent of the fact that the result was mechanically created.
- The result is equal to or better than the most recent human-created solution to a long-standing problem for which there has been a succession of increasingly better human-created solutions.
- The result is equal to or better than a result that was considered an achievement in its field at the time it was first discovered.
- The result solves a problem of indisputable difficulty in its field.
- The result holds its own or wins a regulated competition involving human contestants (in the form of either live human players or human-written computer programs).

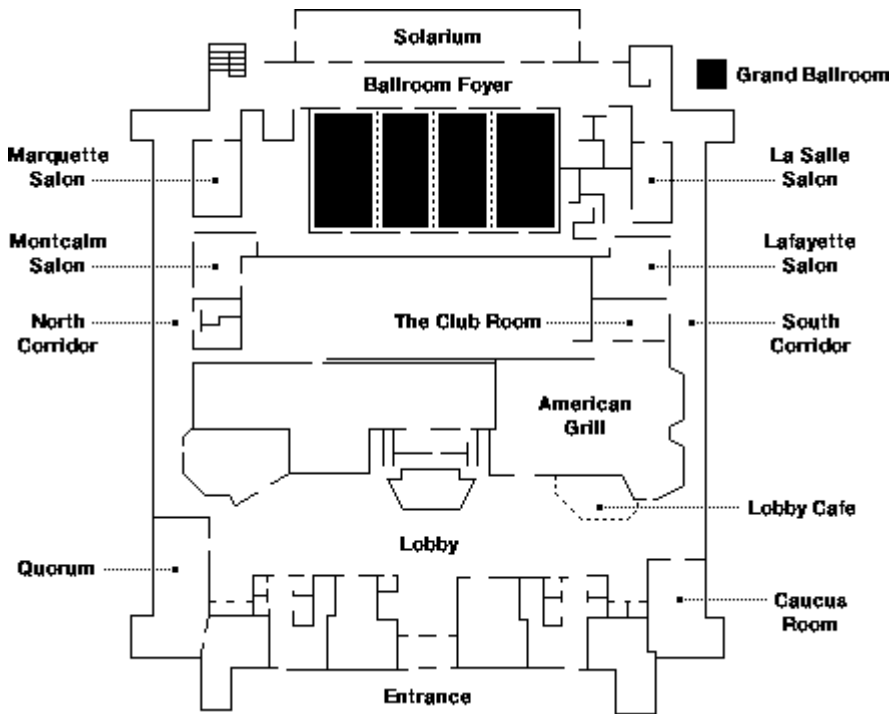
The 2005 judging committee includes:

- Wolfgang Banzhaf (Editor-in-Chief of Genetic Programming and Evolvable Hardware journal)
- David Goldberg (past chair of International Society of Genetic and Evolutionary Computation)
- Erik Goodman (chair of SIGEVO)
- Riccardo Poli (GECCO-2004 Chair)
- Una-May O’Reilly (GECCO-2005 Chair)

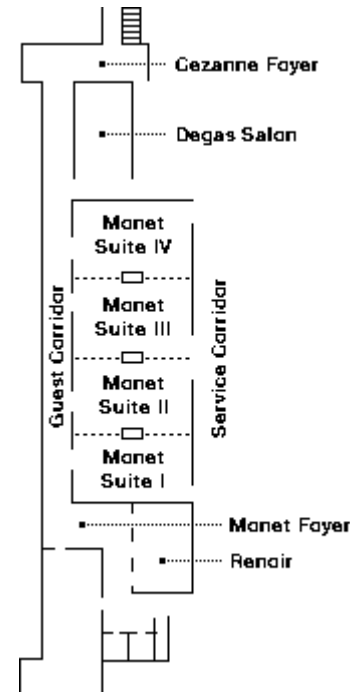
Every new result deemed by the committee to be human-competitive for the past year will get some cash award. The presentation session (HUMMIIES) takes place on Tuesday, 10:15-12:15, in the Grand Ballroom. The judging committee will award prizes during Wednesday’s plenary session (8:00-10:00 in the Grand Ballroom)

Award prizes are sponsored by Third Millennium On-Line Products Inc.

Lobby Level



Second Level



Saturday & Sunday Breaks

Coffee is available in the Grand Ballroom Foyer and the Monet Foyer:

- 10:20-10:40
- 15:50-16:10

Lunch

Lunch is on your own from 12:30-13:50.

Lunchtime Tutorials*

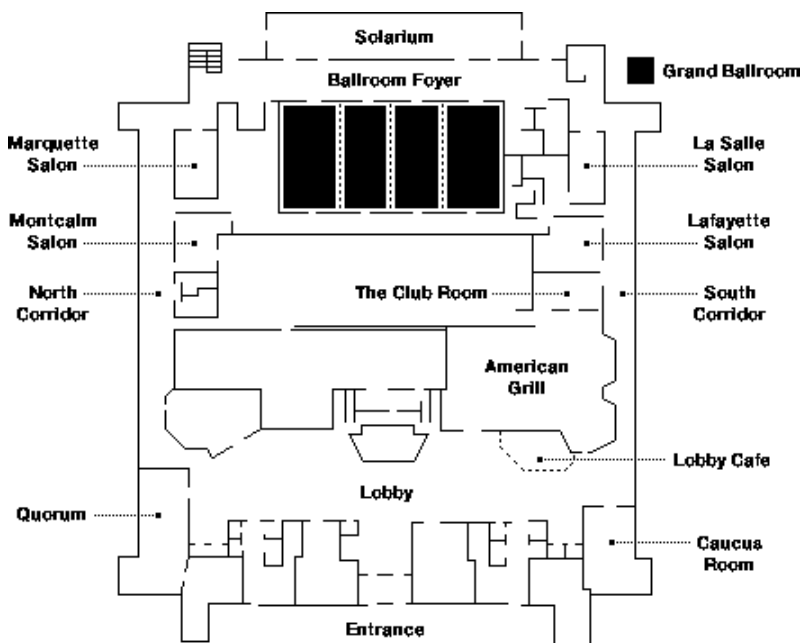
Morning sessions end at 12:30. One-hour lunchtime tutorials begin at 12:50. Lunch is not provided.

Workshop	8:30-10:20	10:40-12:30	12:50-13:50*	14:00-15:50	16:10-18:00
Parameter setting in Genetic and Evolutionary Algorithms <i>Fernando Lobo and Claudio F. Lima</i>	Quorum				
Undergraduate Student Workshop <i>Larry Merkle</i>	Grand Ballroom D				
Theory of Representation <i>Marc Toussaint, Alden H. Wright, Edwin D. de Jong</i>					Renoir
Second Workshop on Military and Security Applications of Evolutionary Computation <i>Stephen C. Upton, Laurence D. Merkle, Misty Blowers</i>					Degas
Graduate Student Workshop <i>Michael O'Neill</i>		Caucus	lunch break		Caucus
Eighth International Workshop on Learning Classifier Systems (IW LCS-2005) <i>Tim Kovacs, Xavier Llorà, Keiki Takadama</i>		Lafayette	lunch break		Lafayette

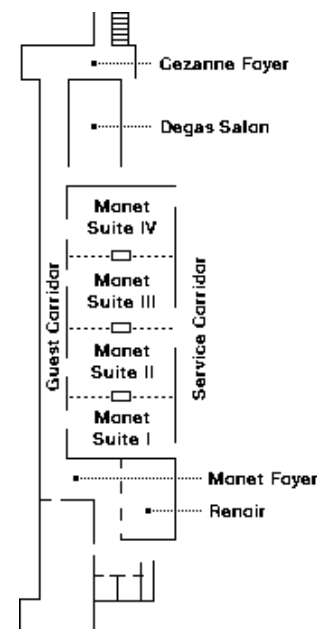
Tutorial	8:30-10:20	10:40-12:30	12:50-13:50*	14:00-15:50	16:10-18:00
Intro to Genetic Algorithms <i>Erik Goodman</i>	Degas				
Genetic Algorithm Theory <i>Jonathan Rowe</i>	Monet III				
Statistics for Evolutionary Computation <i>Steffan Christensen, Mark Wineber</i>	Monet I & II				
Symbolic Regression in Genetic Programming <i>Maarten Keijzer</i>	Monet IV				
Optimization of Dynamic Environments <i>Juergen Branke</i>	Renoir				
Intro to Genetic Programming <i>John Koza</i>		Renoir			
No Free Lunch <i>Darrell Whitley</i>		Monet IV			
Probabilistic Model-Building GAs <i>Martin Pelikan</i>		Monet I & II			
Grammatical Evolution <i>Conor Ryan</i>		Degas			
Spatially Structured EAs <i>Marco Tomassini</i>		Monet III			
Experimental Research in EC <i>Mike Preuss, Thomas Bartz-Beielstein</i>			Monet I & II		
Fitness Approximation in EC <i>Yaochu Jin, Khaled Rasheed</i>			Monet III		
Constraint-Handling Techniques <i>Carlos Coello-Coello</i>			Monet IV		
A Unified Approach to EC <i>Kenneth De Jong</i>				Monet IV	
Bioinformatics <i>James A. Foster</i>				Monet I & II	
Quantum Computing <i>Lee Spector</i>				Monet III	
Evolvable Hardware I <i>Tetsuya Higuchi</i>					Grand Ballroom D
Taxonomy and Course Graining <i>Chris Stephens</i>					Quorum
Evolutionary Robotics <i>Dario Floreano</i>					Monet I & II
Interactive Evolution <i>Hideyuki Takagi</i>					Monet III
Industrial Evolutionary Computing <i>A. Kordon, G. Smits, M. Kotanchek</i>					Monet IV

Workshop	8:30-10:20	10:40-12:30	12:50-13:50*	14:00-15:50	16:10-18:00
Evolutionary Algorithms for for Dynamic Optimization Problems <i>Shengxiang Yang and Juergen Branke</i>	La Salle				
Medical Applications of Genetic and Evolutionary Computation (MedGEC) <i>Stephen L. Smith and Stefano Cagnoni</i>	Caucus				
Second Workshop on self-organization in representations for evolutionary algorithms: Building complexity from simplicity. <i>Ivan I. Garibay, Sanjeev Kumar, Ozlem Garibay, Hal Stringer</i>	Lafayette				
Fourth annual workshop on Biological Applications of Genetic and Evolutionary Computation (BioGEC) <i>Jason H. Moore and Marylyn DeRiggi Ritchie</i>				Caucus	
Ask the Consultant Workshop <i>Dave Davis</i>				Marquette	
Optimization by Building and Using Probabilistic Models (OBUPM-2005) <i>Jörn Grahl, Martin Pelikan, Kumara Sastry</i>				Lafayette	
Scalable, Evolvable, Emergent, Developmental Systems (SEEDS) <i>Gregory Hornby, Sanjeev Kumar, Julian Miller</i>	Quorum				
Coevolution Discussion Forum <i>Anthony Bucci, Edwin de Jong, R. Paul Wiegand</i>					La Salle

Lobby Level



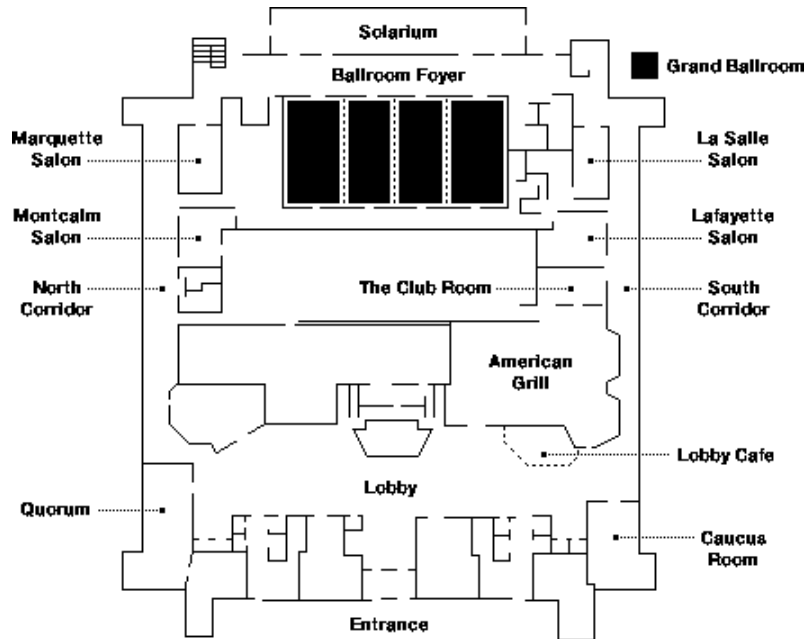
Second Level



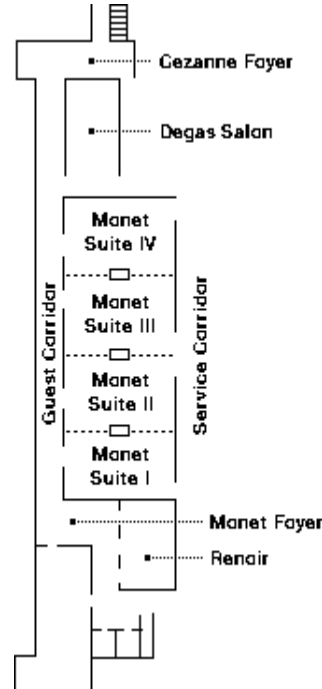
Tutorial	8:30-10:20	10:40-12:30	12:50-13:50*	14:00-15:50	16:10-18:00
Particle Swarm Intelligence <i>Russell Eberhart</i>	Monet III & IV				
Multiobjective Optimization with EC <i>Eckart Zitzler</i>	Monet I & II				
Computational Complexity and EC <i>Ingo Wegener</i>	Renoir				
Evolutionary Music <i>Al Biles</i>	Degas				
Evolution Strategies <i>Thomas Baeck</i>		Monet III & IV			
Evolvable Hardware II <i>Adrian Stoica</i>		Marquette			
Hill Climbing Algorithms <i>Sheldon H. Jacobson</i>		Renoir			
Evolution and Resiliency <i>Terry Soule</i>		Montcalm			
In Vitro Molecular Evolution <i>Byoung-Tak Zhang</i>		Degas			
The XCS Learning Classifier System: From Theory to Application <i>Martin Butz</i>			Monet III & IV		
Experiences Implementing a GA-Based Optimizer in an Aerospace Engineering Application <i>Thomas Dickens</i>			Renoir		
Fitness Landscapes and Problem Difficulty <i>Jean-Paul Watson</i>			Monet I & II		
Representations <i>Franz Rothlauf</i>				Renoir	
Bionik: Building on Biological Evolution <i>Ingo Rechenberg</i>				Degas	
Evolving Neural Networks <i>Risto Mikkulainen</i>				Monet I & II	
Evolutionary Design <i>Ian Parmee</i>					Monet III & IV
Ant Colony Optimization <i>Christian Blum</i>					Monet I & II
Principled Efficiency Enhancement <i>Kumara Sastry</i>					Degas
Learning Classifier Systems <i>Tim Kovacs</i>					Renoir

Hotel Layout

Lobby Level



Second Level



Registration Desk Open Hours

The Registration Desk is located in the **Ballroom Foyer** on the main level.

- Saturday & Sunday : 7:00 – 17:00
- Monday: 7:00 – 17:00
- Tuesday : 7:30 – 17:00
- Wednesday: 8:00 – 12:30

Breaks

Coffee is available in the Grand Ballroom Foyer and the Monet Foyer on the Second Level:

- 10:00-10:15
- 15:40-16:00

Lunch is on your own from 12:15-13:40.

Lounge Room

The **Degas** room is available Monday through Wednesday for you meet with others without disturbing presentations.

Plenary Sessions

Plenary Session are held from 8:30 - 10:00 in the Grand Ballroom:

- Monday Keynote speaker: Dr. Joshua M. Epstein, Brookings Institution, USA
- Tuesday Keynote speaker: Professor Drew Endy, Biological Engineering Division, MIT, USA
- Wednesday: Best Paper, Competitions, and Hummies awards presented. SIGEVO business meeting.

Session ECP-4: Survey Results Tuesday, 12:30-13:10, Grand Ballroom

Results of a survey of the Evolutionary Computation community will be presented during the lunch break. The survey was designed to help the community understand trends in our field, and help Evolutionary Computation graduates find jobs in the community. Lunch is not provided.

Poster Session

The Poster Session is on Tuesday, from 19:00 – 22:00 in the Solarium. Coffee, drinks, and desserts will be served.

Technical Sessions at a Glance

Room	Monday			Tuesday			Wednesday		
	10:15 -12:15	13:40-15:40	16:00-18:00	10:15 -12:15	13:40-15:40	16:00-18:00	10:15 -12:15	13:40-15:40	16:00-18:00
Montcalm	LBP-1	ECP	ESEP-1	LBP-4	ECP	LBP-5	LBP-6	ECP	LBP-8
Marquette	EH-1	LBP-2	MHLS-1	SBSE-1★		COEV-2	SBSE-2	LBP-7	LBP-9
Caucus	COEV-1★	AIS-1★	LCS-1	ESEP-2★	AIS-2	LCS-3	ESEP-3	COEV-3	LBP-10
Quorum	ACSI-1	BA-1★	ACSI-2	RWA-4	LCS-2★	BA-2	BA-3	ACSI-4	RWA-9
Lafayette	EDA-1★	ALERAB-1	ECO-1★	EDA-2	EMO-2	ECO-2	ECO-3	EDA-3	
La Salle	ECP	LBP-3	EMO-1	ECP	EH-2		ECP	AIS-3	
Monet I	GA-1	GA-3	GA-4	GA-6	ACSI-3	ALERAB-4★	GA-10	GA-12	GA-14
Monet II									
Monet III	RWA-1	RWA-2	RWA-3	GA-7	RWA-5	RWA-6★	RWA-7	RWA-8	RWA-10
Monet IV									
Renoir	GP-1	GP-2★	GP-3	ALERAB-2	ALERAB-3	GP-4	GP-5	GP-6	ALERAB-5
Grand Ballroom	GA-2	COMBO★	GA-5	HUMMIES	GA-8★	GA-9★	GA-11	GA-13	GA-15

Key

★	Best Paper Nominees	EH:	Evolvable Hardware
ALERAB	A-Life, Evolutionary Robotics and Adaptive Behavior	EMO	Evolutionary Multiobjective Optimization
ACSI	Ant Colony Optimization and Swarm Intelligence	ESEP	Evolutionary Strategies, Evolutionary Programming
AIS	Artificial Immune Systems	GA	Genetic Algorithms
BA:	Biological Applications	GP:	Genetic Programming
COEV	Coevolution	LBP	Late Breaking Papers
COMBO	Best Papers from ACSI, EMO, and MHLS	LCS	Learning Classifier Systems and Other Genetics-Based Machine Learning
ECO	Evolutionary Combinatorial Optimization	MHLS	Meta-heuristics and Local Search
ECP	Evolutionary Computation in Practice	RWA	Real World Applications
EDA	Estimation of Distribution Algorithms	SBSE	Search-based Software Engineering

Late Breaking Papers-1

Chair: *last presenter*

Montcalm	■10:15	Analyzing the Intelligence of a Genetically Programmed Chess Player <i>Ami Hauptman, Moshe Sippe</i>
	■10:30	System Identification Using Off-Optimum Data From A Genetic Algorithm <i>Stephen Shervais</i>
	■10:45	Digital Circuit Design Using Dynamic Fitness Functions <i>Cecilia Reis, Tenreiro Machado, Boaventura Cunha</i>
	■11:00	An Evolutionary SPDE breeding based Hybrid Particle Swarm Optimizer: Application in Coordination of Robot Ants for Camera Coverage Area Optimization <i>Debray De, Sonai Rai, Amit Konar, Amita Chatterjee</i>
	■11:15	An analysis of iterated density estimation and sampling in the UMDAc algorithm <i>Jörn Grahl, Stefan Minner, Franz Rothlauf</i>
	■11:30	School Bus Routing using Harmony Search <i>Zong Geem</i>

Evolvable Hardware 1

Chair: Julian Miller

Marquette	■10:15	Multiple-Level Concatenated Coding in Embryonics: A Dependability Analysis <i>Lucian Prodan, Mihai Udrescu, Mircea Vladutiu</i>
	■10:45	A Hardware Pipeline for Function Optimization using Genetic Algorithms <i>Malay K Pakhira, Rajat K De</i>
	■11:15	Evolving Analog Controllers for Correcting Thermoacoustic Instability in Real Hardware <i>Saranyan A Vignanam, John C Gallagher, Sanjay K Boddhu</i>

Coevolution 1: Best Paper Nominees

Chair: *to be determined*

Caucus	■10:15	★ Co-Evolving Recurrent Neurons Learn Deep Memory POMDPs <i>Faustino Gomez, Juergen Schmidhuber</i>
	■10:45	★ Monotonic Solution Concepts in Coevolution <i>Sevan G. Ficici</i>
	■11:15	★ Understanding Cooperative Co-evolutionary Dynamics via Simple Fitness Landscapes <i>Elena Popovici, Kenneth De Jong</i>

ACSI 1: Particle Swarm Optimization Hybrids

Chair: James Kennedy

Quorum	■10:15	Breeding Swarms: A GA/PSO Hybrid <i>Matthew L Settles, Terence Soule</i>
	■10:45	Constrained Optimization via Particle Evolutionary Swarm Optimization Algorithm (PESO) <i>Angel Eduardo Muñoz-Zavala, Arturo Hernández-Aguirre, Enrique Villa-Diharce</i>
	■11:15	Improving Particle Swarm Optimization with Differentially Perturbed Velocity <i>S Das, A Konar, U K Chakraborty</i>
	■12:15	Exploring Extended Particle Swarms: A Genetic Programming Approach <i>Riccardo Poli, Cecilia Di Chio, William B Langdon</i>

Estimation of Distribution Algorithms-1: Best Paper Nominees

Chair: Martin Pelikan

Lafayette	■10:15	★ Sub-Structural Niching in Estimation of Distribution Algorithms <i>Kumara Sastry, Hussein A. Abbass, David E. Goldberg, D. D. Johnson</i>
	■10:45	★ Extracted Global Structure Makes Local Building Block Processing Effective in XCS <i>Martin V. Butz, Martin Pelikan, Xavier Llorà, David E. Goldberg</i>
	■11:15	★ Not All Linear Functions Are Equally Difficult for the Compact Genetic Algorithm <i>Stefan Droste</i>

ECP-1: Design Applications

Chair: Thomas Baeck

La Salle

- 10:15 Strategies for Design Optimization: Lessons from Automotive Systems
Erik Goodman, Red Cedar Technology

- 10:45 Evolutionary Computation for the Automated Design of Space Systems
Rich Terrile, Jet Propulsion Laboratory

- 11:15 Lens Design Using Hybrid Coded NSGA2
Shaine Joseph, University of Missouri-Rolla

- 11:45 Evolution Strategies for Engineering Design Optimization
Thomas Baeck, NuTech Solutions

GA-1: Parallel Genetic Algorithms

Chair: Marco Tomassini

Monet I- II

- 10:15 The influence of migration sizes and intervals on island models
Zbigniew Skolicki, Kenneth De Jong

- 10:45 Takeover Time Curves in Random and Small-World Structured Populations
Mario Giacobini, Marco Tomassini, Andrea G.B. Tettamanzi

- 11:15 Parallel Genetic Algorithms on Line Topology of Heterogeneous Computing Resources
Yiyuan Gong, Morikazu Nakamura, Shiro Tamaki

- 11:45 Advanced Models of Cellular Genetic Algorithms Evaluated on SAT
Enrique Alba, Hugo Alfonso, Bernabé Dorronsoro

Real World Applications-1: Economics and Finance

Chair: Eric Bonabeau

Monet III-IV

- 10:15 Applying Metaheuristic Techniques to Search the Space of Bidding Strategies in Combinatorial Auctions
Ashish Sureka, Peter R Wurman

- 10:45 Interactive Estimation of Agent-Based Financial Markets Models: Modularity and Learning
Ihsan Ecemis, Eric Bonabeau, Trent Ashburn

- 11:15 Genetic Fuzzy Discretization with Adaptive Intervals for Classification Problems
Yoon-Seok Choi, Byoung-Ro Moon, Sang Yong Seo

- 11:45 Stock Prediction Based on Financial Correlation
Yung-Keun Kwon, Sung-Soon Choi, Byung-Ro Moon

GP-1: Modular and Hierarchical GP

Chair: Susan Steney

Renoir

- 10:15 Resource-Limited Genetic Programming: The Dynamic Approach
Sara Silva, Ernesto Costa

- 10:45 Measuring, Enabling and Comparing Modularity, Regularity and Hierarchy in Evolutionary Design
Gregory S. Hornby

- 11:15 meta-Grammar Constant Creation with Grammatical Evolution by Grammatical Evolution
Ian Dempsey, Michael O'Neill, Anthony Brabazon

GA-2: Analysis and Applications

Chair: Kenneth De Jong

Grand Ballroom

- 10:15 Quality-Time Analysis of Multi-Objective Evolutionary Algorithms
Jian-Hung Chen, Shinn-Ying Ho, David E. Goldberg

- 10:45 Statistical Analysis of Heuristics for Evolving Sorting Networks
Lee Graham, Hassan Masum, Franz Oppacher

- 11:15 Pricing the 'Free Lunch' of Meta-Evolution
Alexei V Samsonovich, Kenneth A De Jong

- 11:45 Terrain Generation Using Genetic Algorithms
Teong Joo Ong, Ryan L. Saunders, John Keyser, John J. Leggett

ECP-2: Marketing/Energy Applications

Chair: Cem Baydar

- Montcalm
- 13:40 Better Marketing Analytics Using Genetic Algorithms
Doug Newell, Genalytics Inc.

 - 14:10 Evolutionary Graphical Design
Eric Bonabeau, Icosystem Corporation

 - 14:40 Symbolic Regression in Multicollinearity Problems
Flor Castillo, The Dow Chemical Company

 - 15:10 Applying Genetic Programming to Reservoir History Matching Problem
Tina Yu, ChevronTexaco

Late Breaking Papers-2

Chair: last presenter

- Marquette
- 13:40 The Species Compete-Die out (SCD) Algorithms Model for Evolutionary Computation
Meng Yao, Chun-Ni Dai, Min Pei, Zhu-Jie Xie, Chun-Hong Chen

 - 13:55 The Principal Component Particle Swarm Optimization (PCPSO)
Mark Voss

 - 14:10 Interpolation and Exploration of Response Surfaces using Evolutionary NURBS, LaGrange Constraint and Cylindrical Operators
Alejandro Peña, Jesus Antonio Hernandez R.

 - 14:25 Two Ways to Grow Tissue for Artificial Immune Systems
Peter Bentley, Julie Greensmith, Supiya Ujjin

 - 14:40 Design of an Adaptive Mutation Operator in an Electrical Load Management Case Study
Alvaro Gomes, C. Henggeler Antunes, A. Gomes Martin

 - 14:55 Rank Aggregation For Metasearch Engines Using a Self-Adaptating Genetic Algorithm With Multiple Genomic Representations
Michael Gargano, Kasinadhuni Maheswaraprasad

Artificial Immune Systems-1: Best Paper Nominees

Chair: Carlos A. Coello Coello

- Caucus
- 13:40 ★ An Artificial Immune Network for Multimodal Function Optimization on Dynamic Environments
Fabricio Olivetti de Franca, Fernando J. Von Zuben, Leandro Nunes de Castro

 - 14:10 ★ Discriminating and Visualizing Anomalies Using Negative Selection and Self-Organizing Maps
Fabio A González, Juan Carlos Galeano, Diego Alexander Rojas, Angélica Veloza-Suan

 - 14:40 ★ Sufficiency Verification of HIV-1 Pathogenesis based on Multi-Agent Simulation
Zaiyi Guo, Hann Kwang Han, Joc Cing Tay

 - 15:10 Estimating the Detector Coverage in a Negative Selection Algorithm
Zhou Ji, Dipankar Dasgupta

Biological Applications-1: Regulation, Expression, Structure

Chair: James A. Foster

- Quorum
- 13:40 ★ A Hybrid Genetic Algorithm with Pattern Search for Finding Heavy Atoms in Protein Crystals
Joshua L. Payne, Margaret J. Eppstein

 - 14:10 ★ Particle Swarm Optimization for Analysis of Mass Spectral Serum Profiles
Habtom Ressom, Rency S Varghese, Daniel Saha, Eduard Orvisky, Lenka Goldman, Emanuel F Petricoin, Thomas P Conrads, Timothy D Veenstra, Mohamed Abdel-Hamid, Christopher A Loffredo

 - 14:40 ★ A GA for Maximum Likelihood Phylogenetic Inference using Neighbour-Joining as a Genotype to Phenotype Mapping
Leon Poladian

 - 15:10 A Co-evolutionary Hybrid Algorithm for Multi-objective Optimization of Gene Regulatory Network Models
Praveen Koduru, Sanjoy Das, Stephen Welch, Judith L Roe, Zenaida P Lopez-Dee

ALERAB-1: Robotics

Chair: Ehud Schlessinger

- Lafayette
- 13:40 The Predictive Basis of Situated and Embodied Artificial Intelligence
Keith L Downing

 - 14:10 Evolving Visually Guided Agents in an Ambiguous Virtual World
Ehud Schlessinger, Peter J. Bentley, R. Beau Lotto

Late Breaking Papers-3

Chair: *last presenter*

La Salle

- 13:40 Exploratory Research on Molecular Communication between Nanomachines
Tatsuya Suda, Michael Moore, Tadashi Nakano, Ryota Egashira, Akihiro Enomoto

- 13:55 Model Reference Adaptive Search: A New Approach to Global Optimization
Jiaqiao Hu, Michael Fu, Steven Marcus

- 14:10 Applying Evolutionary Multi-Objective Optimization to Mission Planning for Time-Sensitive Targets
Brad Rosenberg, Janet Burge, Paul Gonsalves

- 14:25 Beneficial Aspects of Neutrality in GP
Edgar Galvan Lopez, Katya Rodriguez, Riccardo Poli

- 14:40 Genetic Algorithm Strategies for Voronoi Classifier Navigation
Matthew Skalny, Jim Overholt, Greg Hudas, Graham Fiorani

GA-3: Techniques I

Chair: Helio Barbosa

Monet I- II

- 13:40 Genetic Algorithms using Low-Discrepancy Sequences
Shuhei Kimura, Koki Matsumura

- 14:10 Improvements to Penalty-Based Evolutionary Algorithms for the Multi-Dimensional Knapsack Problem Using a Gene-Based Adaptive Mutation Approach
A. Sima Uyar, Gulsen Eryigit

- 14:40 A Genetic Algorithm Encoding for a Class of Cardinality Constraints
Helio J.C. Barbosa, Afonso C.C. Lemonge

- 15:10 Adaptive Isolation Model using Data Clustering for Multimodal Function Optimization
Shin Ando, Jun Sakuma, Shigenobu Kobayashi

Real World Applications-2: Telecom

Chair: David Montana

Monet III-IV

- 13:40 Optimizing Parameters of a Mobile Ad Hoc Network Protocol with a Genetic Algorithm
David Montana, Jason Redi

- 14:10 An Artificial Immune System Algorithm for CDMA Multiuser Detection over Multi-Path Channels
Maoguo Gong, Licheng Jiao, Haifeng Du, Ling Wang

- 14:40 An Ant Colony Algorithm for Multi-user Detection in Wireless Communication Systems
Samer Hijazi, Bala Natarajan, Sanjoy Das

- 15:10 A Multi-objective Algorithm for DS-CDMA Code Design Based on the Clonal Selection Principle
Daniel Stevens, Sanjoy Das, Bala Natarajan

GP-2: Best Paper Nominees

Chair: Terence Soule

Renoir

- 13:40 ★ Finding Needles in Haystacks is Harder with Neutrality.
M Collins

- 14:10 ★ Open-ended Robust Design of Analog Filters Using Genetic Programming
Jianjun Hu, Xiwei Zhong, Erik Goodman

- 14:40 Towards Identifying Populations that Increase the Likelihood of Success in Genetic Programming
Jason M. Daida

- 15:10 Total Synthesis of Algorithmic Chemistries
Christian W. G. Lasarczyk, Wolfgang Banzhaf

Combo: ACSI, EMO, and MHLS Best Paper Nominees

Chair: Jean-Paul Watson

Grand Ballroom

- 13:40 ★ BeeAdHoc: An Energy Efficient Routing Algorithm for Mobile Ad Hoc Networks Inspired by Bee Behavior
Horst. F. Wedde, Muddassar Farooq, Thorsten Panmenbaecker, Bjoern Vogel, Christian Mueller, Johannes Meth, Rene Jeruschkat

- 14:10 ★ Minimum Spanning Trees Made Easier Via Multi-Objective Optimization
Frank Neumann, Ingo Wegener

- 14:40 ★ The Enhanced Evolutionary Tabu Search and Its Application to the Quadratic Assignment Problem
John F McLoughlin III, Walter Cedeno

ESEP-1: Applications and New Techniques

Chair: Dr. Bernhard Sendhoff

Montcalm	■16:00	A Differential Evolution Based Incremental Training Method for RBF Networks <i>Junhong Liu, Jouni Lampinen</i>
	■16:30	Evolutionary Strategies for Multi-Scale Radial Basis Function Kernels in Support Vector Machines <i>Tanasanee - Phienthrakul, Boonserm - Kijirikul</i>
	■17:00	Morphing Methods in Evolutionary Design Optimization <i>Michael Nashvili, Markus Olhofer, Bernhard Sendhoff</i>
	■17:30	Simple Addition of Ranking Method for Constrained Optimization in Evolutionary Algorithms <i>Pei Yee Ho, Kazuyuki Shimizu</i>

Meta-heuristics and Local Search-1:

Chair: Jean-Paul Watson

Marquette	■16:00	Two Improved Differential Evolution Schemes for Faster Global Search <i>S Das, A Konar, U K Chakraborty</i>
	■16:30	Enhancing Differential Evolution Performance with Local Search for High Dimensional Function Optimization <i>Nasimul Noman, Hitoshi Iba</i>

LCS-1: Concept Learning and Data mining

Chair: Tim Kovacs

Caucus	■16:00	Analysis of the Initialization Stage of a Pittsburgh Approach Learning Classifier System <i>Jaume Bacardit</i>
	■16:30	DXCS: an XCS System for Distributed Data Mining <i>Hai Huong Dam, Hussein A. Abbass, Chris Lokan</i>
	■17:00	Constructive Induction and Genetic Algorithms for Learning Concepts with Complex Interaction <i>Leila Shila Shafti, Eduardo Perez Perez</i>
	■17:30	XCS for Robust Automatic Target Recognition <i>B. Ravichandran, Avinash Gandhe, Robert Elliott Smith</i>

ACSI-2: Swarm Intelligence Applications

Chair: Christian Blum

Quorum	■16:00	Ant Colony Optimization for Power Plant Maintenance Scheduling Optimization <i>Wai Kuan Foong, Holger Robert Maier, Angus Ross Simpson</i>
	■16:30	Breeding Swarms: A New Approach to Recurrent Neural Network Training <i>Matthew L Settles, Paul Nathan, Terence Soule</i>
	■17:00	Evolving Agent Swarms for Clustering and Sorting <i>Vegard Hartmann</i>

Evolutionary Combinatorial Optimization 1: Best Paper Nominees

Chair: Franz Rothlauf

Lafayette	■16:00	★ Evolutionary Algorithms for the Self-Organized Evolution of Networks <i>Katharina A Lehmann, Michael Kaufmann</i>
	■16:30	★ On the Analysis of the Approximation Capability of Simple Evolutionary Algorithms for Scheduling Problems <i>Christian Gunia</i>
	■17:00	Transition Models as an Incremental Approach for Problem Solving in Evolutionary Algorithms <i>Anne M Defaweux, Tom Lenaerts, Jano van Hemert, Johan Parent</i>
	■17:30	The Blob Code is Competitive with Edge-Sets in Genetic Algorithms for the Minimum Routing Cost Spanning Tree Problem <i>Bryant A Julstrom</i>

Evolutionary Multiobjective Optimization-1: Methods

Chair: Sushil Louis

La Salle	■16:00	An Empirical Study on the Handling of Overlapping Solutions in Evolutionary Multiobjective Optimization <i>Hisao Ishibuchi, Kaname Narukawa, Yusuke Nojima</i>
	■16:30	Exploiting Gradient Information in Numerical Multi-Objective Evolutionary Optimization <i>Peter A.N. Bosman, Edwin D. de Jong</i>
	■17:00	Fitness Inheritance For Noisy Evolutionary Multi-Objective Optimization <i>Lam Thu Bui, Hussein A. Abbass, Daryl Essam</i>
	■17:30	Comparison of Evolutionary Multiobjective Optimization with Reference Solution-Based Single-Objective Approach <i>Hisao Ishibuchi, Kaname Narukawa</i>

GA-4: Theory

Chair: Annie Wu

Monet I- II	■16:00	Some Theoretical Results About the Computation Time of Evolutionary Algorithms <i>Lixin Ding, Jinghu Yu</i>
	■16:30	EA Models and Population Fixed-Points Versus Mutation Rates for Functions of Unitation <i>J Neal Richter, John Paxton, Alden Wright</i>
	■17:00	Phase Transition in a Random NK Landscape Model <i>Sung-Soon Choi, Kyomin Jung, Jeong Han Kim</i>
	■17:30	Behavior of Finite Population Variable Length Genetic Algorithms Under Random Selection <i>Hal Stringer, Annie S Wu</i>

RWA-3: Engineering Design

Chair: *to be determined*

Monet III-IV	■16:00	Improving EA-based Design Space Exploration by Utilizing Symbolic Feasibility Tests <i>Thomas Schlichter, Christian Haubelt, Jürgen Teich</i>
	■16:30	Parameterized versus Generative Representations in Structural Design: An Empirical Comparison <i>Rafal Kicinger, Tomasz Arciszewski, Kenneth De Jong</i>
	■17:00	MRI Magnet Design: Search Space Analysis, EDAs and a Real-World Problem with Significant Dependencies <i>Bo Yuan, Marcus Gallagher, Stuart Crozier</i>
	■17:30	An Efficient Evolutionary Algorithm Applied to the Design of Two-dimensional IIR Filters <i>S. Das, A. Konar, U. K. Chakraborty</i>

GP-3: Applications

Chair: Emily M. Zechman

Renoir	■16:00	Parsing and Translation of Expressions by Genetic Programming <i>David Jackson</i>
	■16:30	Evolution of a Human-Competitive Quantum Fourier Transform Algorithm Using Genetic Programming <i>Paul Massey, John A Clark, Susan Stepney</i>
	■17:00	Evolving Fuzzy Decision Tree Structure that Adapts in Real-Time <i>James F. Smith</i>
	■17:30	CGP Visits the Santa Fe Trail: Effects of Heuristics on GP <i>Cezary Z Janikow, Christopher J Mann</i>

GA-5: Fitness

Chair: Xavier Llorà

Grand Ballroom	■16:00	Designing Resilient Networks Using a Hybrid Genetic Algorithm Approach <i>Abdullah Konak, Alice A.E. Smith</i>
	■16:30	Towards an Analysis of Dynamic Environments <i>Jurgen Branke, Erdem Salihoglu, Sima Uyar</i>
	■17:00	Preservation of Genetic Redundancy in The Existence of Developmental Error and Fitness Assignment Error <i>Ayşe Selen Yilmaz, Annie S Wu</i>
	■17:30	Combating User Fatigue in iGAs: Partial Ordering, Support Vector Machines, and Synthetic Fitness <i>Xavier F Llorà, Kumara Sastry, David E Goldberg, Abhimanyu Gupta, Lalitha Lakshmi</i>

Late Breaking Papers-4

Chair: *last presenter*

Montcalm	■10:15	Comparison of Multi-Objective Genetic Algorithms in Optimizing Q-Law Low-Thrust Orbit Transfers <i>Seungwon Lee, Paul von Allmen, Wolfgang Fink, Anastassios E. Petropoulos, Richard J. Terrile</i>
	■10:30	Evolving Driving Agent for Remote Control of Scaled Model of a Car <i>Ivan Tanev, Michal Joachimczak, Hitoshi Hemmi, Katsunori Shimohara</i>
	■11:45	The Impact of Pseudorandom Number Quality on P-RnaPredict, a Parallel Genetic Algorithm for RNA Secondary Structure Prediction <i>Kay C. Wiese, Andrew Hendriks, Alain Deschenes, Belgacem Ben Youssef</i>
	■11:00	Reduced Human Fatigue Interactive Evolutionary Computation for Micromachine Design <i>Raffi Kamalian, Ying Zhang, Hideyuki Takagi, Alice M. Agogino</i>
	■11:30	Addressing the Even-n-parity problem using Compressed Linear Genetic Programming <i>Johan Parent, Annie Nowe, Anne Defaweux</i>
	■12:45	Automatic Concept Evolution (ACE) <i>Terence Claus Fogarty</i>

SBSE-1: Software Testing

Chair: Massimiliano Di Penta

Marquette	■10:15	★Stress Testing Real-Time Systems with Genetic Algorithms <i>Lionel C. Briand, Yvan Labiche, Marwa Shousha</i>
	■10:45	★Evolutionary Testing of State-Based Programs <i>Phil McMinn, Mike Holcombe</i>
	■11:15	Using Evolutionary Algorithms for the Unit Testing of Object-Oriented Software <i>Stefan Wappler, Frank Lammermann</i>
	■12:15	Search-Based Mutation Testing for Simulink Models <i>Yuan Zhan, John A. Clark</i>

ESEP-2: Theory

Chair: Thomas Jansen

Caucus	■10:15	★Theoretical Analysis of a Mutation-Based Evolutionary Algorithm for a Tracking Problem in the Lattice <i>Thomas Jansen, Ulf Schellbach</i>
	■10:45	Local and Global Order 3/2 Convergence of a Surrogate Evolutionary Algorithm <i>Anne Auger, Marc Schoenauer, Olivier Teytaud</i>
	■11:15	★On the Impact of Objective Function Transformations on Evolutionary and Black-Box Algorithms <i>Tobias Storch</i>
	■12:15	★Rigorous Runtime Analysis of a $(\mu+1)$ -ES for the Sphere function <i>Carsten Witt, Jens Jägersküpper</i>

RWA-4: System Diagnosis and Testing

Chair: Julien Budynek

Quorum	■10:15	A Comparison of Evolutionary Algorithms for System-Level Diagnosis <i>Bogdan T. Nassu, Elias P. Duarte, Jr., Aurora T.R. Pozo</i>
	■10:45	Evolving Computer Intrusion Scripts for Vulnerability Assessment and Log Analysis <i>Julien Budynek, Eric Bonabeau, Ben Shargel</i>
	■11:15	Classification of Human Decision Behavior: Finding Modular Decision Rules with Genetic Algorithms <i>Franz Rothlauf, Daniel Schunk, Jella Pfeiffer</i>
	■12:15	Determining Equations for Vegetation Induced Resistance using Genetic Programming <i>Maarten Keijzer, Martin Baptist, Vladan Babovic, Javier Rodriguez Uthurburu</i>

EDA-2: Theory, Robustness, and Scalability

Chair: Kumara Sastry

Lafayette	■10:15	On the Convergence of an Estimation of Distribution Algorithm Based on Linkage Discovery and Factorization <i>Alden H. Wright, S.V.P.M. Sandeep Pulavarty</i>
	■10:45	Combining Competent Crossover and Mutation Operators: a Probabilistic Model Building Approach <i>Claudio F. Lima, Kumara Sastry, David E. Goldberg, Fernando G. Lobo</i>
	■11:15	On the Importance of Diversity Maintenance in Estimation of Distribution Algorithms <i>Bo Yuan, Marcus Gallagher</i>
	■11:45	Multiobjective hBOA, Clustering, and Scalability <i>Martin Pelikan, Kumara Sastry, David E. Goldberg</i>

Technical Sessions

Tuesday

10:15 – 12:15

ECP-3: Technology Transfer from Academia to Industry I

Chair: David Davis

La Salle	■10:15	How To Get Industry Projects If You're An Academic <i>Darrell Whitley, Colorado State University</i>
	■10:45	Crystallographic Case Study in an Interdisciplinary Evolutionary Computation Course <i>Margaret Eppstein, The University of Vermont</i>
	■11:15	University Models for Industrial Interactions <i>Thomas Baeck, NuTech Solutions</i>

GA-6: GA Techniques II

Chair: Dirk Thierens

Monet I- II	■10:15	An Adaptive Pursuit Strategy for Allocating Operator Probabilities <i>Dirk Thierens</i>
	■10:45	The Problem with a Self-Adaptative Mutation Rate in Some Environments: A Case Study using the Shaky Ladder Hyperplane-Defined Functions <i>William Rand, Rick Riolo</i>
	■11:15	Efficient Credit Assignment through Evaluation Function Decomposition <i>Adrian Agogino, Kagan Tumer, Risto Miikkulainen</i>
	■12:15	Subproblem Optimization by Gene Correlation with Singular Value Decomposition <i>Jacob G Martin</i>

GA-7: Crossover and Linkage

Chair: Tian-Li Yu

Monet III-IV	■10:15	Latent Variable Crossover for k-tablet Structures and its Application to Lens Design Problems <i>Jun Sakuma, Shigenobu Kobayashi</i>
	■10:45	Schema Disruption in Tree-Structured Chromosomes <i>William A Greene</i>
	■11:15	A Comparison Study between Genetic Algorithms and Bayesian Optimize Algorithms by Novel Indices <i>Naoki Mori, Masayuki Takeda, Keinosuke Matsumoto</i>
	■12:15	Linkage Learning, Overlapping Building Blocks, and Systematic Strategy for Scalable Recombination <i>Tian-Li Yu, Kumara Sastry, David E Goldberg</i>

ALERAB-2: Design

Chair: John Reiffel

Renoir	■10:15	Agent-Based Modelling of Product Invention <i>Anthony Brabazon, Arlindo Silva, Tiago Ferra de Sousa, Michael O'Neill, Robin Matthews, Ernesto Costa</i>
	■10:45	Automated Assembly as Situated Development <i>John Reiffel, Jordan Pollack</i>
	■11:15	Multiplex PCR Primer Design for Gene Family Using Genetic Algorithm <i>Hong-Long Liang, Chungnan Lee, Jain-Shing Wu, Yow-Ling Shiue</i>
	■12:15	Evolutionary Form-Finding of Tensegrity Structures <i>Chandana Paul, Hod Lipson, Francisco J. Valero-Cuevas</i>

Hummies

Grand Ballroom	■10:15	Hummie finalist presentations about human-competitive results that they have produced by some form of genetic and evolutionary computation in the previous year.
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Lunch Session 12:30 – 13:10

ECP-4: Technology Transfer from Academia to Industry II

Chair: David Davis

Grand Ballroom	■12:30	Results of the EC Survey <i>Gregory Hornby, NASA Ames Research Center</i>
	■10:45	R&D Best Practices and Technology Vision <i>Cem Baydar, Accenture</i>
	■11:15	How To Get Hired In Industry If You're A Student <i>David Davis, NuTech Solutions</i>

ECP-5: Biomedical Applications

Chair: Bill Worzel

Montcalm	■13:40	Multi-objective Optimization for Concurrent Mining of Disparate Genomic Datasets <i>Cole Harris, Exagen Diagnostics, Inc.</i>
	■14:10	Neuro-Fuzzy-Evolutionary Computing <i>Masoud Nikravesh, The Berkeley Initiative in Soft Computing</i>
	■14:40	Using GP To Develop Rules For Staging Bladder Cancer <i>Bill Worzel, Genetics Squared, Inc.</i>

Artificial Immune Systems-2

Chair: Fernando J. Von Zuben/Fabio Gonzalez

Caucus	■13:40	Is Negative Selection Appropriate for Anomaly Detection ? <i>Thomas Stibor, Philipp Mohr, Jonathan Timmis, Claudia Eckert</i>
	■14:10	An Evolutionary Algorithm to Generate Hyper-Ellipsoid Detectors for Negative Selection <i>Joseph M Shapiro, Gary B Lamont, Gilbert L Peterson</i>
	■14:40	A Comparative Analysis of Artificial Immune Network Models <i>Juan Carlos Galeano, Angélica Veloza-Suan, Fabio A González</i>
	■15:10	On the Contribution of Gene Libraries to Artificial Immune Systems <i>Peter Spellward, Tim Kovacs</i>

LCS-2: Best Paper Nominees

Chair: Stewart Wilson

Quorum	■13:40	★ A First Order Logic Classifier System <i>Drew Mellor</i>
	■14:10	★ Modeling Systems with Internal State using Evolino <i>Daan Wierstra, Faustino Gomez, Juergen Schmidhuber</i>
	■14:40	★ Kernel-based, Ellipsoidal Conditions in the Real-Valued XCS Classifier System <i>Martin V. Butz</i>
	■15:10	Extending XCSF Beyond Linear Approximation <i>Pier Luca Lanzi, Daniele Loiacono, Stewart W. Wilson, David E Goldberg</i>

EMO-2: Applications

Chair: Hisao Ishibuchi

Lafayette	■13:40	A Multi-Objective Genetic Algorithm for Robust Design Optimization <i>Mian Li, Shapour Azarm, Vikrant Aute</i>
	■14:10	Evolving Optimal Feature Extraction using Multi-objective Genetic Programming: A Methodology and Preliminary Study on Edge Detection <i>Zhang Yang, Rockett I Peter</i>
	■14:40	A Scalable Parallel Genetic Algorithm for X-ray Spectroscopic Analysis <i>Kai Xu, Sushil J. Louis, Roberto C. Mancini</i>
	■15:10	Minimizing Total Flowtime and Maximum Earliness on a Single Machine Using Multiple Measures of Fitness <i>Mary E. Kurz, Sarah Canterbury</i>

Evolvable Hardware-2

Chair: Julian Miller

La Salle

- 13:40 Evolutionary Computation applied to the Tuning of MEMS gyroscopes
Didier Keymeulen, Wolfgang Fink, Michael I. Ferguson, Chris Peay, Boris Oks, Rich Terrile, Karl Yee

- 14:10 Toward Evolved Flight
Rusty Hunt, Gregory S. Hornby, Jason D. Lohn

ACSI-3: Particle Swarm Optimization Behaviour

Chair: *to be determined*

Monet I- II

- 13:40 Dynamic-Probabilistic Particle Swarms
James Kennedy

- 14:10 Bayesian Optimization Models for Particle Swarms
Christopher K. Monson, Kevin D. Seppi

- 14:40 Exposing Origin-Seeking Bias in PSO
Christopher K. Monson, Kevin D. Seppi

RWA-5: Vision and Image Processing

Chair: John Koza

Monet III-IV

- 13:40 Automated Re-Invention of Six Patented Optical Lens Systems using Genetic Programming
John R. Koza, Sameer H. Al-Sakran, Lee W. Jones

- 14:10 GAMM: Genetic Algorithms with Meta-Models for Vision
Greg Lee, Vadim Bulitko

- 14:40 Effective Image Compression using Evolved Wavelets
Uli Grasmann, Risto Miikkulainen,

- 15:10 Hierarchical Multi-sensor Image Registration Using Evolutionary Computation
Ju Han, Bir Bhanu

ALERAB-3: A-Life

Chair: Sean Luke

Renoir

- 13:40 Evolutionary Computation and the C-value Paradox
Sean Luke

- 14:10 Validation of Evolutionary Activity Metrics for Long-Term Evolutionary Dynamics
Andrew Stout, Lee Spector

- 14:40 Bias and Scalability in Evolutionary Development
Timothy G.W. Gordon, Peter J. Bentley

- 15:10 Predicting Population Dynamics and Evolutionary Trajectories based on Performance Evaluations in Alife Simulations
Matthias J. Scheutz, Paul W. Schermerhorn

GA-8: Best Paper Nominees I

Chair: Khaled Rasheed

Grand Ballroom

- 13:40 ★Measuring Mobility and the Performance of Global Search Algorithms
Monte Lunacek, Darrell Whitley, James N. Knight

- 14:10 ★Memory-Based Immigrants for Genetic Algorithms in Dynamic Environments
Shengxiang Yang

- 14:40 ★On Favoring Positive Correlations between Form and Quality of Candidate Solutions via the Emergence of Genomic Self-Similarity
Ivan I Garibay, Annie S Wu, Ozlem O Garibay

- 15:10 ★On the Complexity of Hierarchical Problem Solving
Edwin D. de Jong, Richard A. Watson, Dirk Thierens

Late Breaking Papers-5

Chair: last presenter

Montcalm	■16:00	Co-operative OuLiPian Generative Literature using Human Based Evolutionary Computing <i>Michelle Okaley Hammond, Terence Claus Fogarty</i>
	■16:15	FAPSTER - A Generic Algorithm for Frequency Assignment Problem <i>Nihat Karaoglu, Bernard Manderick</i>
	■16:45	Evolving Multi-Variate Time-Series Patterns for the Discrimination of Fraudulent Financial Filings <i>Thomas Kiehl, Bethany Hoogs, Christina LaComb, Deniz Senturk</i>
	■17:00	Evolutionary Algorithms for Optimal Error-Correcting Codes <i>Wolfgang Haas, Sheridan Houghten</i>
	■17:15	Lessons Learned in Modeling Dynamic Systems using Genetic Programming <i>Juan Flores, Mario Graff</i>
	■17:30	Discussions on LGA with Parallel System <i>Peng Gang, Takeshi Nakatsuru, Shigeru Nakayama</i>

COEV-2: Combining Reliability and Efficiency

Chair: Pablo Funes

Marquette	■16:00	Intransitivity Revisited: Coevolutionary Dynamics of Numbers Games <i>Pablo Funes, Enrique R Pujals</i>
	■16:30	The MaxSolve Algorithm for Coevolution <i>Edwin D. de Jong</i>
	■17:00	On Identifying Global Optima in Cooperative Coevolution <i>Anthony Bucci, Jordan B. Pollack</i>
	■17:30	Managed Challenge' Alleviates Disengagement in Co-evolutionary System Identification <i>Josh Bongard, Hod Lipson</i>

LCS-3: Multistep Environments and Reinforcement Learning

Chair: Pier Luca Lanzi

Caucus	■16:00	XCS with Eligibility Traces <i>Jan Drugowitsch, Alwyn M Barry</i>
	■16:30	ATNoSFERES revisited <i>Samuel Landau, Olivier Sigaud, Marc Schoenauer</i>
	■17:00	An Abstraction Algorithm for Genetics-based Reinforcement Learning <i>Will Browne, Dan Scott</i>
	■17:30	XCS with Computed Prediction in Multistep Environments <i>Pier Luca Lanzi, Daniele Loiacono, Stewart W Wilson, David E. Goldberg</i>

BA-2: Patterns and Structures

Chair: Jason Moore

Quorum	■16:00	Discovering Biological Motifs With Genetic Programming <i>Rolv Seehuus, Amund Tveit, Ole Edsberg</i>
	■16:30	MDGA: Motif Discovery Using A Genetic Algorithm <i>Dongsheng Che, Yinglei Song, Khaled Rasheed</i>
	■17:00	A Multi-Objective Evolutionary Approach to Peptide Structure Redesign and Stabilization <i>Tim Hohm, Daniel Hoffmann</i>
	■17:30	An Efficient Genetic Algorithm for Predicting Protein Tertiary Structures in the 2D HP Model <i>Thang N. Bui, Gnanasekaran Sundarraj</i>

Evolutionary Combinatorial Optimization-2

Chair: Benjamin Skellett

Lafayette	■16:00	Greedy, Genetic, and Greedy Genetic Algorithms for the Quadratic Knapsack Problem <i>Bryant A Julstrom</i>
	■16:30	An Evolutionary Lagrangian Method for the 0/1 Multiple Knapsack Problem <i>Yourim Yoon, Yong-Hyuk Kim, Byung-Ro Moon</i>
	■17:00	Hyper-heuristics and Classifier Systems for Solving 2D-Regular Cutting Stock Problems <i>H. Terashima-Marín, E. J. Flores-Álvarez, P. Ross</i>
	■17:30	Solving Large Scale Combinatorial Optimization Using PMA-SLS <i>Jing Tang, Meng Hiot Lim, Yew Soon Ong, Meng Joo Er</i>

ALERAB-4: Best Paper Nominees

Chair: Daniel Ashlock

Monet I- II	■16:00	★ Optimization with Constraints using a Cultured Differential Evolution Approach <i>Ricardo Landa Becerra, Carlos A. Coello Coello</i>
	■16:30	★ A Study of Evolutionary Robustness in Stochastically Tiled Polyominoes. <i>Daniel A Ashlock, Justin Schonfeld</i>
	■17:00	★ Constructing Good Learners using Evolved Pattern Generators <i>Vinod Valsalam, James Bednar, Risto Miikkulainen</i>
	■17:30	Autonomous Navigation System Applied to Collective Robotics with Ant-Inspired Communication <i>Renato Reder Cazangi, Fernando J. Von Zuben, Mauricio F. Figueiredo</i>

RWA-6: Best Paper Nominees

Chair: Eric Bonabeau

Monet III-IV	■16:00	★ Learning Basic Navigation for Personal Satellite Assistant Using Neuroevolution <i>Yiu Fai Sit, Risto Miikkulainen</i>
	■16:30	★ Mission Planning for Joint Suppression of Enemy Air Defenses Using a Genetic Algorithm <i>Jeffrey P Ridder, Jason C HandUber</i>
	■17:00	★ Genetic Algorithms for the Sailor Assignment Problem <i>Deon Garrett, Dipankar Dasgupta, Joseph Vannucci, Rodrigo Silva, James Simien</i>
	■17:30	★ Map-labelling with a Multi-objective Evolutionary Algorithm <i>Lucas Bradstreet, Luigi Barone, Lyndon While</i>

GP-4: Theory and Bloat

Chair: Nicholas McPhee

Renoir	■16:00	Probing for Limits to Building Block Mixing with a Tunably-Difficult Problem for Genetic Programming <i>Jason M. Daida, Michael E. Samples, Matthew J. Byom</i>
	■16:30	Dormant Program Nodes and the Efficiency of Genetic Programming <i>David Jackson</i>
	■17:00	Exploiting Disruption Aversion to Control Code Bloat <i>Jason F Stevens, Robert B Heckendorn, Terry Soule</i>

GA-9: Best Paper Nominees

Chair: Darrell Whitley

Grand Ballroom	■16:00	★ Improving GA Search Reliability Using Maximal Hyper-Rectangle Analysis <i>Chongshan Zhang, Khaled Rasheed</i>
	■16:30	★ On the Stationary Distribution of GAs with Fixed Crossover Probability <i>U. C. de Silva, J. Suzuki</i>

- A Genetic Algorithm for Optimized Reconstruction of Quantized One-dimensional Signals
Frank W Moore
- A Hybrid Evolutionary Algorithm for the p-Median Problem
Borgulya Istvan
- Heuristic Rules Embedded Genetic Algorithm to Solve In-Core Fuel Management Optimization Problem
Fatih Alim, Kostadin Ivanov
- Genetic Drift in Univariate Marginal Distribution Algorithm
Yi Hong, Qingsheng Ren, Jin Zeng
- Event-driven Learning Classifier Systems for Online Soccer Games
Yuji Sato, Ryutaro Kanno
- Harmony Search for Structural Design
Zong Woo Geem, Kang Seok Lee, Chung-Li Tseng
- A Genetic Algorithm Approach to the Selection of Near-Optimal Subsets from Large Sets
P Whiting, P W Poon, J N Carter
- Water Distribution Systems Optimal Design Using Cross Entropy
Lina Perelman, Avi Ostfeld
- Search Space Modulation in Genetic Algorithms
Jose Antonio Martin H
- Hybridizing Evolutionary Algorithms and Clustering Algorithms to Find Source-Code Clones
Andrew Sutton, Huzefa Kagdi, Jonathan I Maletic, L Gwenn Volkert
- Gene-Level Multi-parent Recombination Operator with Polynomial or Lognormal Distribution for Real Coded Genetic Algorithm
M. M. Raghuvanshi, O. G. Kakde
- Knowledge Insertion: An Efficient Approach to Reduce Effort in Simple Genetic Algorithms for Unrestricted Parallel Equal Machines Scheduling
Edgardo Ferretti, Susana Cecilia Esquivel
- Benefits of Software Measures for Evolutionary White-Box Testing
Frank Lammernann, Stefan Wappler
- Isolating the Benefits of Respect
Stephen Chen, Gregory Pitt
- An Investigation into Using Genetic Programming as a Means of Inducing Solutions to Novice Procedural Programming Problems
Nelishia Pillay
- Inexact Pattern Matching using Genetic Algorithm
Surapong Auwatanamongkol
- Performance Assessment of an Artificial Immune System Multiobjective Optimizer by Two Improved Metrics
Maoguo Gong, Licheng Jiao, Haifeng Du, Ronghua Shang, Bin Lu
- Can We Vaccinate Parallel Systems Against Programs?
Franciszek Sereczynski, Grzegorz Wojtyla, Krzysztof Rządca
- Fractional Dynamic Fitness Functions for GA-based Circuit Design
Cecilia Reis, J. A. Tenreiro Machado, J. Boaventura Cunha
- Adaptive Crossover and Mutation in Genetic Algorithms Based on Clustering Technique
Jun N/A Zhang, Henry S.H Chung, hui jin Zhong
- Symbolic Regression in Multicollinearity Problems
Flor A. Castillo, Carlos M. Villa
- Factors Governing The Behavior of Multiple Cooperating Swarms
Mohammed H. El-Abd, Mohamed S. Kamel
- Simulating Swarm Intelligence in Honey Bees: Foraging in Differently Fluctuating Environments
Thomas Schmickl, Ronald Thenius, Karl Crailsheim
- A New Evolutionary Method for Time Series Forecasting
Tiago Alessandro Espinola Ferreira, Germano Crispim Vasconcelos, Paulo Jorge Leitão Adeodato
- Diversity as a Selection Pressure in Dynamic Environments
Lam Thu Bui, Jurgen Branke, Hussein A. Abbass

Poster Session

- Adaptative Sizing of Populations and Number of Islands in Distributed Genetic Algorithms
Johan Berntsson, Maolin Tang
- Dynamic Optimization of Migration Topology in Internet-based Distributed Genetic Algorithms
Johan Berntsson, Maolin Tang
- Identifying Valid Solutions for the Inference of Regulatory Networks
Christian Spieth, Felix Streichert, Nora Speer, Andreas Zell
- Evolving an Improved Axial Structure for Fibrillar Collagen
David E Cairns, Graeme J Cameron, Tim JWess
- Directional Self-Learning of Genetic Algorithm
Lin Cong, Yuheng Sha, Licheng Jiao, Fang Liu
- Primer Design for Multiplex PCR Using a Genetic Algorithm
Feng-Mao Lin, Hsien-Da Huang, His-Yuan Huang, Jorng-Tzong Horng
- Optimal Number of Evolution Strategies Mutation Step Sizes in Dynamic Environments
Lutz Schönemann
- Niching in Evolution Strategies
Ofer M. Shir, Thomas Baeck
- Intrinsic Emergence boosts Adaptive Capacity
Christophe Philemotte, Hugues Bersini
- Conformation of an Ideal Bucky Ball Molecule by Genetic Algorithm and Geometric Constraint from Pair Distance Data
David M. Cherba, William Punch, Phil Duxbury
- Alternative Implementations of The Griewangk Function
Artem Sokolov, Darrell Whitley, Monte Lunacek
- Normalization for Neural Network in Genetic Search
Jung-Hwan Kim, Sung-Soon Choi, Byung-Ro Moon
- Evolution of Multi-Loop Controllers for Fixed Morphology with a Cyclic Genetic Algorithm
Gary B. Parker, Ramona Georgescu
- Multiple Objectives Evolutionary Algorithms for Multiple Sequence Alignment
Pasut Seeluangsawat, Prabhas Chongsatitvatana,
- Compact Genetic Algorithm for Active Interval Scheduling in Hierarchical Sensor Networks
Ming-Hui Jin, D. Frank Hsu, Ren-Guey Lee, Cheng-Yan Kao, Yu-Cheng Huang, Chih-Kung Lee
- Evolutionary Models for Maternal Effects in Simulated Developmental Systems
Artur Matos, Reiji Suzuki, Takaya Arita
- A comparison of Messy GA and permutation based GA for Job Shop Scheduling
Pio Fenton, Paul Walsh
- New Evolutionary Techniques for Test-Program Generation for Complex Microprocessor Cores
Ernesto Sanchez, Massimiliano Schillaci, Matteo Sonza Reorda, Giovanni Squillero, Luca Sterpone, Massimo Violante
- Goal-Oriented Preservation of Essential Genetic Information by Offspring Selection
Michael Affenzeller, Stefan Wagner, Stephan Winkler
- Fitness-based Neighbor Selection for Multimodal Optimization
Shin Ando, Shigenobu Kobayashi
- Hybrid Real-Coded Mutation for Genetic Algorithms Applied to Graph Layouts
Dana Vrajitoru, Jason DeBoni
- The Compact Classifier System \Motivation, Analysis, and First Results
Xavier F Llorà, Kumara Sastry, David E Goldberg
- A Modified Particle Swarm Optimization Predicted by Velocity
Zhihua Cui, Jianchao Zeng
- GA-Facilitated Classifier Optimization with Varying Similarity Measures
Michael R Peterson, Travis E Doom, Michael L Raymer

Poster Session

- Probabilistic Distribution Models for EDA-based GP
Kohsuke Yanai, Hitoshi Iba
- Multi-Objective Optimization of Diesel Engine Emissions and Fuel Economy Using SPEA2+
Tomoyuki Hiroyasu, Mitsunori Miki, Seiichi Nakayama, Yoshiko Hanada
- Using Gene Deletion and Gene Duplication in Evolution Strategies
Karlheinz Schmitt
- On the Practical Genetic Algorithms
Chang Wook Ahn, Sanghoun Oh, R. S. Ramakrishna
- Backwardchaining Genetic Programming
Riccardo Poli, William B. Langdon
- Evolutionary Change in Developmental Timing
Kei Ohnishi, Kaori Yoshida
- A Mutation Operator for Evolution Strategies to Handle Constrained Problems
Oliver Kramer, Chaun-Kang Ting, Hans Kleine Büning
- A Case Study of Process Facility Optimization using Discrete Event Simulation and Genetic Algorithm
Keshav P. Dahal, Stuart J. Galloway, Graeme M. Burt, Jim R. McDonald, Ian Hopkins
- Multi-Niche Crowding in the Development of Parallel Genetic Simulated Annealing
Zhi-Gang Wang, Mustafizur Rahman, Yoke-San Wong
- A Model Based on Ant Colony System and Rough Set Theory to Feature Selection
Yudel Gómez, Ann Nowé, Yailé Caballero, Peter Vrancx
- GA-based Approach to Discover Meaningful Biclusters
Federico Divina, Jesus Aguilar-Ruiz
- The Emulation of Social Institutions as a Method of Coevolution
Deborah Vakas Duong, John Grefenstette
- Multiobjective VLSI Cell Placement Using Distributed Genetic Algorithm
Sadiq M. Sait, Mohammed Faheemuddin, Mahmood R. Minhas, Syed Sanaullah
- The Impact of Pseudorandom Number Quality on P-RnaPredict, a Parallel Genetic Algorithm for RNA Secondary Structure Prediction
Kay C. Wiese, Andrew Hendriks, Alain Deschenes, Belgacem Ben Youssef
- Using Evolutionary Optimization to Improve Markov-based Classification with Limited Training Data
Timothy Meekhof, Robert B. Heckendorn
- A Statistical Learning Theory Approach of Bloat
Sylvain Gelly, Olivier Teytaud, Nicolas Bredeche, Marc Schoenauer
- Evaluating GP Schema in Context
Hammad Majeed, Conor Ryan, R. Muhammad Atif Azad
- RABNET: A Real-Valued Antibody Network for Data Clustering
Helder Knidel, Leandro Nunes dos Santos, Fernando José von Zuben
- GATS 1.0: A Novel GA-based Scheduling Algorithm for Task Scheduling on Heterogeneous Processor Nets
Mohammad Daoud, Nawwaf Kharna
- Hybrid Multiobjective Genetic Algorithm with a New Adaptive Local Search Process
Salem F Adra, IAN Griffin, Peter J Fleming
- Scalability of Genetic Programming and Probabilistic Incremental Program Evolution
Radovan Ondas, Martin Pelikan, Kumara Sastry
- Analysis and Mathematical Justification of a Fitness Function used in an Intrusion Detection System
Pedro A. Diaz-Gomez, Dean F. Hougen
- Multiobjective Shape Optimization with Constraints based on Estimation Distribution Algorithms and Correlated Information
Sergio Ivvan Valdez-Peña, Salvador Botello-Rionda, Arturo Hernández-Aguirre
- Using Predators and Preys in Evolution Strategies
Karlheinz Schmitt, Jörn Mehnen, Thomas Michelitsch
- Function Choice, Resiliency and Growth in Genetic Programming
Sireesha Besetti, Terence Soule

Poster Session

Introducing a Watermarking with a Multi-Objective Genetic Algorithm

Diego Sal, Manuel Graña

Collaborative Interactive Evolution

Sean R. Szumlanski, Annie S Wu, Charles E. Hughes

ARGEN + AREPO: Mixing the Artificial Genetic Engineering and Artificial Evolution of Populations to Improve the Search Process

Agustín León Barranco, Sandra Barajas Montiel, Carlos Reyes García

MeSwarm: Memetic Particle Swarm Optimization

Bo-Fu Liu, Hung-Ming Chen, Jian-Hung Chen, Shiow-Fen Hwang, Shinn-Ying Ho

Preventing Overfitting in GP with Canary Functions

Nathan Foreman, Matthew P Evett

The effectiveness of Multiobjective optimizer in single-objective optimization environment

Shinya Watanabe, Kazutoshi Sakakibara

MOEA Design of Robust Digital Symbol Sets

Richard O Day, Abel S Nunez, Gary B Lamont

An Extension of Voseø's Markov Chain Model for Genetic Algorithms

Anna Beata Paszyska

Neighboring Crossover to Improve GA-Based Q-Learning Method for Multi-Legged Robot Control

Tadahiko Murata, Masatoshi Yamaguchi

Evolutionary Tree Genetic Programming

Ján Antolík, William H. Hsu

Generating Feasible Input Sequences for Extended Finite State Machines (EFSMs) using Genetic Algorithms

Karnig Derderian, Robert M. Hierons, Mark Harman, Qiang Guo

A Comparative Study of Probability Collectives Based Multi-agent Systems and Genetic Algorithms

Chien-Feng Huang, Stefan Bieniaowski, David H. Wolpert, Charlie E. Strauss

Parameter Sweeps for Exploring GP Parameters

Michael E. Samples, Jason M Daida, Matt Byom, Matt Pizzimenti

Solving Geometric TSP with Ants

Thang N. Bui, Mufit Colpan

Genetic Programming for Association Rules on Card Sorting Data

Michelle Lyman, Gary Lewandowski

Design of Air Pump System Using Bond Graph and Genetic Programming Method

Kisung Seo, Erik D. Goodman, Ronald C. Rosenberg

Learning Computer Programs with the Bayesian Optimization Algorithm

Moshe Looks, Ben Goertzel, Cassio Pennachin

Shape Nesting by Coevolving Species

Jeffrey Horn

Comparative Evaluation of Parallelization Strategies for Evolutionary and Stochastic Heuristics

Sadiq M. Sait, Syed Sanaullah, Ali Mustafa Zaidi, Mustafa I. Ali

GA-Based Parameter Tuning for Multi-Agent Systems

Joseph J Haas, Maxim Peysakhov, Spiros Mancoridis

Evolving Recurrent Models Using Linear GP

Xiao Luo, Malcolm I. Heywood, A. Nur Zincir-Heywood

Late Breaking Papers-6

Chair: *last presenter*

Montcalm	■10:15	Autonomous Robot Motion Planning in Diverse Terrain Using Genetic Algorithms <i>Terrence Fries</i>
	■10:30	Comparative Study of Several Multi-Objective Genetic Algorithms <i>Ali Farhang Mehr</i>
	■10:45	Queue-based Genetic Programming <i>Elko Tchernev, Dhananjay Phatak</i>
	■11:00	Genetic Programming for Discrimination of Buried Unexploded Ordnance (UXO) <i>Edwin Roger Banks, Edwin Nunez, Paul Agarwal, Claudette Owens, Marshall McBride, Ron Liedel</i>
	■11:15	An Incremental Approach to the Proportional GA <i>Han Yu, Annie Wu</i>
	■11:45	Optimal groundwater sampling network design through ant colony optimization <i>Amy Chan Hilton, Yuanhai Li</i>

SBSE-2: Software Modularization & Networking

Chair: Yvan Labiche

Marquette	■10:15	An Empirical Study of the Robustness of Two Module Clustering Fitness Functions <i>Mark Harman, Stephen Swift, Kiarash Mahdavi</i>
	■10:45	Search-based Improvement of Subsystem Decompositions <i>Olaf Seng, Markus Bauer, Matthias Biehl, Gert Pache</i>
	■11:15	Improving Network Applications Security: a New Heuristic to Generate Stress Testing Data <i>Concettina Del Grosso, Giuliano Antoniol, Massimiliano Di Penta, Philippe Galinier, Ettore Merlo</i>
	■12:15	An Approach for QoS-aware Service Composition based on Genetic Algorithms <i>Gerardo Canfora, Massimiliano Di Penta, Raffaele Esposito</i>

ESEP-3: Multimodal Optimization

Chair: Mike Preuss

Caucus	■10:15	Counteracting Genetic Drift and Disruptive Recombination in $(\mu+, \lambda)$ -EA on Multimodal Fitness Landscapes <i>Mike Preuss, Lutz Schoenemann, Michael Emmerich</i>
	■10:45	Efficient Differential Evolution using Speciation for Multimodal Function Optimization <i>Xiaodong Li</i>

BA-3: Expression and Biomedicine

Chair: Wolfgang Banzhaf

Quorum	■10:15	Extraction of Informative Genes from Microarray Data <i>Topon Kumar Paul, Hitoshi Iba</i>
	■10:45	Inference of Gene Regulatory Networks Using S-system and Differential Evolution <i>Nasimul Noman, Hitoshi Iba</i>
	■11:15	Epileptic Seizure Detection by Means of Genetically Programmed Artificial Features <i>Hiran Firpi, Erik Goodman, Javier Echaz</i>
	■12:15	Using Evolutionary Computation Methods to Support Analytical Models for the Evolution and Maintenance of Conditional Strategies in <i>Chthamalus anisopoma</i> <i>Gloria Childress Townsend, Wade N. Hazel, Rick Smock</i>

Evolutionary Combinatorial Optimization-3

Chair: Bryant A. Julstrom

Lafayette	■10:15	Maximally Rugged NK Landscapes Contain the Highest Peaks <i>Benjamin Skellett, Benjamin Cairns, Nicholas Geard, Bradley Tonkes, Janet Wiles</i>
	■10:45	Towards a Self-Stopping Evolutionary Algorithm Using Coupling From The Past <i>German Hernandez, Kenneth Wilder, Fernando Nino, Julian Garcia</i>
	■11:15	Coordinating Multi-Rover Systems: Evaluation Functions for Dynamic and Noisy Environments <i>Kagan Tumer, Adrian Agogino</i>

ECP-6: Military Applications

Chair: Kenneth De Jong

La Salle

- 10:15 Army Applications

- 10:45 Navy Applications

- 11:15 Air Force Applications

GA-10: Problem Analysis

Chair: Nic McPhee

Monet I- II

- 10:15 Crossover is Provably Essential for the Ising Model on Trees
Dirk Sudholt

- 10:45 Walsh Transforms, Balanced Sum Theorems and Partition Coefficients over Multary Alphabets.
Teresa Iglesias, Bart Naudts, Alain Verschoren, Concepción Vidal

- 11:15 Computing the Epistasis Variance of Large-Scale Traveling Salesman Problems
Dong-Il Seo, Byung-Ro Moon

- 12:15 A Theoretical Analysis of the HIFF Problem
Nicholas Freitag McPhee, Ellery Fussell Crane

RWA-7: Various Applications

Chair: Garnett Wilson

Monet III-IV

- 10:15 Use of a Genetic Algorithm in Brill's Transformation-Based Part-of-Speech Tagger
Garnett C Wilson, Malcolm I Heywood

- 10:45 an Ageing" Operator and its Use in the Highly Constrained Topological Optimization of HVAC System Design
Jonathan A Wright, Yi Zhang

- 11:15 Genetic Algorithm Optimization of Superresolution Parameters
Barry M Ahrens

- 12:15 Predicting Mining Activity with Parallel Genetic Algorithms
Sam Talaie, Ryan E. Leigh, Sushil J. Louis, Gary L. Raines

GP-5: Representations

Chair: Robert Heckendorn

Renoir

- 10:15 The Push3 Execution Stack and the Evolution of Control
Lee Spector, Jon Klein, Maarten Keijzer

- 10:45 Molecular Programming: Evolving Genetic Programs in a Test Tube
Byoung-Tak Zhang, Ha-Young Jang

- 11:15 Multi-Chromosomal Genetic Programming
Rachel Cavill, Steve L Smith, Andy M Tyrrell

- 12:15 Investigating the Performance of Module Acquisition in Cartesian Genetic Programming
James Alfred Walker, Julian Francis Miller

GA-11: Learning

Chair: Jesus Aguilar

Grand Ballroom

- 10:15 Automatic Feature Selection in Neuroevolution
Shimon Whiteson, Peter Stone, Kenneth O Stanley, Risto Miikkulainen, Nate Kohl

- 10:45 From Supervised Ranking to Evolving Behaviours of A Robotic Team
Kai Wing Tang, Ray A. Jarvis

- 11:15 Feature Influence for Evolutionary Learning
Raul Giraldez, Jesus S. Aguilar-Ruiz

- 12:15 Evolving Neural Network Ensembles for Control Problems
David Pardoe, Michael Ryoo, Risto Miikkulainen

ECP-7: Panel Discussion

Chair: David Davis

Montcalm ■13:40 Topic: Evolutionary Computation applications in the next ten years

Late Breaking Papers-7

Chair: *last presenter*

Marquette	■13:40	Benchmarking Evolutionary Algorithms: The Huygens Suite <i>Cara MacNish</i>
	■13:55	Evolving a Neural Network Active Vision System for Shape Discrimination <i>Derek James, Philip Tucker</i>
	■14:10	Co-evolution of Fitness Maximizers and Fitness Predictors <i>Michael Schmidt, Hod Lipson</i>
	■14:25	Evolving Buildable Flapping Ornithopters <i>Floris van Breugel, Hod Lipson</i>
	■14:40	Using Fuzzy Logic to Relax Constraints in GA-Based Service Composition <i>Massimiliano Di Penta, Luigi Troiano</i>
	■15:55	Spontaneous emergence of self-replicating, competing cube species in physical cube automata <i>Greg Studer, Hod Lipson</i>

COEV-3: Exploring the Environment

Chair: Chien-Feng Huang

Caucus	■13:40	Investigating the Success of Spatial Coevolution <i>Nathan Lawrence Williams, Melanie Mitchell</i>
	■14:10	Tracking Extrema in Dynamic Environments using a Coevolutionary Agent-based Model of Genotype Edition <i>Chien-Feng Huang, Luis M. Rocha</i>

ACSI-4: From Differential Evolution, Over Multi-objective Optimization, to Self-organization

Chair: Terence Soule

Quorum	■13:40	Promising Infeasibility and Multiple Offspring Incorporated to Differential Evolution for Constrained Optimization <i>Efrén Mezura-Montes, Jesús Velázquez-Reyes, Carlos A. Coello Coello</i>
	■14:10	An Effective Use of Crowding Distance in Multiobjective Particle Swarm Optimization <i>Carlo Rapanan Raquel, Prospero C Naval, Jr.</i>
	■14:40	Scale Invariant Pareto Optimality: A Meta-Formalism For Characterizing and Modeling Cooperativity in Evolutionary Systems <i>Mark A Fleischer</i>

EDA-3: Univariate EDAs, Real-valued EDAs, and EDAs for GP

Chair: Peter A. N. Bosman

Lafayette	■13:40	Population-Based Incremental Learning with Memory Scheme for Changing Environments <i>Shengxiang Yang</i>
	■14:10	Using a Markov Network Model in a Univariate EDA: An Empirical Cost-Benefit Analysis <i>Siddhartha Shakya, John McCall, Deryck Brown</i>
	■14:40	Learned Mutation Strategies in Genetic Programming for Evolution and Adaptation of Simulated Snakebot <i>Ivan T Tanev</i>
	■15:10	Real-coded Crossover as a Role of Kernel Density Estimation <i>Jun Sakuma, Shigenobu Kobayashi</i>

Artificial Immune Systems-3

Chair: Zhou Ji

La Salle

- 13:40 Artificial Immune System for Solving Generalized Geometric Problems: A Preliminary Results
Jui-Yu Wu, Yun-Kung Chung

- 14:10 Applying both Positive and Negative Selection to Supervised Learning for Anomaly Detection
Xiaoshu Hang, Honghua Dai

- 14:40 The Application of Antigenic Search Techniques to Time Series Forecasting
Ian Nunn, Tony White

GA-12: Search Space Analysis

Chair: Riccardo Poli

Monet I- II

- 13:40 New Topologies for Genetic Search Space
Yong-Hyuk Kim, Byung-Ro Moon

- 14:10 Information Landscapes
Yossi Borenstein, Riccardo Poli

- 14:40 Information Landscapes and Problem Hardness
Yossi Borenstein, Riccardo Poli

- 15:10 Information Landscapes and the Analysis of Search Algorithms
Yossi Borenstein, Riccardo Poli

RWA-8: Process and Control

Chair: Tuan Pham

Monet III-IV

- 13:40 Evolutionary Optimization of Dynamic Control Problems Accelerated by Progressive Step Reduction
Tuan Q Pham

- 14:10 Incorporating Fuzzy Knowledge into Fitness: Multiobjective Evolutionary 3D Design of Process Plants
Ingo Mierswa

- 14:40 An Enhanced GA to Improve the Search Process Reliability in Tuning of Control Systems
Andrea Soltoggio

GP-6: Evolving Cooperation

Chair: James A. Walker

Renoir

- 13:40 Evolving Cooperative Strategies for UAV Teams
Marc D. Richards, Darrell Whitley, J. Ross Beveridge, Todd Mytkowicz, Duong Nguyen, David Rome

- 14:10 Multipopulation Cooperative Coevolutionary Programming (MCCP) to Enhance Design Innovation
Emily M Zechman, S. Ranji Ranjithan

- 14:40 Genetic Network Programming with Automatically Defined Groups for Assigning Proper Roles to Multiple Agents
Tadahiko Murata, Takashi Nakamura

GA-13: Applications

Chair: Marc Schoenauer

Grand Ballroom

- 13:40 Multi-level Genetic Algorithm (MLGA) for the Construction of Clock Binary Tree
Nan Guofang, Li Minqiang, Kou Jisong

- 14:10 Application of Genetic Algorithm to Optimize Burnable Poison Placement in Pressurized Water Reactors
Serkan Yilmaz, Kostadin Ivanov, Samuel Levine

- 14:40 Evolution of Voronoi based Fuzzy Recurrent Controllers
Carlos Kavka, Patricia Roggero, Marc Schoenauer

- 15:10 Flight Midcourse Guidance Control Based On Genetic Algorithm
yang zhaohua, fang jiancheng, qi zhenqiang

Late Breaking Papers-8

Chair: *last presenter*

Montcalm

- 16:00 The Multi-objective Evolution of Mobile Robot Behavior
Praveen Koduru, Ashish Ahuja, Kyle McDowell, Lukas Lansky, Sanjoy Das, Stephen Welch

- 16:15 Data Mining Using Hybrid Evolutionary Models for Creating Data Classification Rules
Bora Uran, Michael Gargano

- 16:45 A Case for Exhaustive Optimization
Sanza Kazadi, Michele Lee, Lauren Lee

- 17:00 Asphalt Pavement Crack Classification: A Comparison of GA, MLP, and SOM
Haroun Rababaah, Dana Vrajitoru, James Wolfer

- 17:15 Classification of Seafloor Habitats using Genetic Programming
Sara Silva, Yao-Ting Tseng

- 17:30 Incorporating Advice into Evolution of Neural Networks
Chern Han Yong, Kenneth O. Stanley, Risto Miikkulainen

Late Breaking Papers-9

Chair: *last presenter*

Marquette

- 16:00 An FPGA-Based General Purpose Neural Network Chip With On-Chip Learning
Yaser M.A. Khalifa, Yu Jen Fan

- 16:15 Reinventing the Wheel: An Experiment in Geometric Innovation
Josh Bongard, Hod Lipson

- 16:45 A Statistical Comparison of Grammatical Evolution Strategies in the Domain of Human Genetics
Bill White, Joshua Gilbert, Jason Moore

- 17:00 Blind Inference of Nonlinear Cable Network Topology from Sparse Data
Vic Anand, Hod Lipson, Francisco Valero-Cuevas

Late Breaking Papers-10

Chair: *last presenter*

Caucus

- 16:00 Prefix Gene Expression Programming
Xin Li, Chi Zhou, Weimin Xiao, Peter C. Nelson

- 16:15 Finding the Optimal Search Dimension for Evolution Strategies with a small Population
Yaochu Jin, Markus Olhofer, Bernhard Sendhoff

- 16:45 FTO: A genetic algorithm for tunnel design optimisation
Martin Reed, Stefan Schenk, Gunter Swoboda

Real World Applications-9

Chair: Risto Miikkulainen

Quorum

- 16:00 Three Dimensional Evolutionary Aerodynamic Design Optimization with CMA-ES
Martina Hasenjäger, Bernhard Sendhoff, Toyotaka Sonoda, Toshiyuki Arima

- 16:30 Optimization of Passenger Car Design for the Mitigation of Pedestrian Head Injury Using a Genetic Algorithm
Emma L Carter, Stephen Ebdon, Clive Neal-Sturgess

- 17:00 Neuroevolution of an Automobile Crash Warning System
Kenneth O. Stanley, Nate Kohl, Rini Sherony, Risto Miikkulainen

- 17:30 The Molecule Evaluator: an Interactive Evolutionary Algorithm for Designing Drug Molecules
Eric-Wubbo Lameijer, Ad IJzerman, Joost Kok, Thomas Baeck

GA-14: Selection

Chair: Mitch Potter

Monet I- II	■16:00	Fitness Uniform Deletion: A Simple Way to Preserve Diversity <i>Shane Legg, Marcus Hutter</i>
	■16:30	Unbiased Tournament Selection <i>Artem Sokolov, Darrell Whitley</i>
	■17:00	Applying Price's Equation to Survival Selection <i>Jeffrey K Bassett, Mitchell A Potter, Kenneth A De Jong</i>

RWA-10: Various Applications

Chair: Jeremiah Nummela

Monet III-IV	■16:00	Evolving Petri Nets to Represent Metabolic Pathways <i>Jeremiah Nummela, Bryant A Julstrom</i>
	■16:30	Pareto Feeders <i>Grant Cochenour, Jerad Simon, Sanjoy Das, Anil Paktwa, Surasish Nag</i>
	■17:00	Nonlinear Feature Extraction Using a Neuro Genetic Hybrid <i>Yung-Keun Kwon, Byung-Ro Moon</i>

ALERAB-5: Agents

Chair: Michelle McPartland

Renoir	■16:00	Emergence of Communication in Competitive Multi-Agent Systems: A Pareto Multi-Objective Approach <i>Michelle McPartland, Stefano Nolfi, Hussein A. Abbass</i>
	■16:30	The Impact of Cellular Representation on Finite State Agents for Prisoner's Dilemma <i>Daniel A Ashlock, Eun-Youn Kim</i>
	■17:00	Using a Genetic Algorithm to Evolve Behavior in Multi Dimensional Cellular Automata <i>R. Breukelaar, Th. Baeck</i>
	■17:30	Comparing Multicast and Newscast Communication in Evolving Agent Societies <i>A E Eiben, M C Schut, T Toma</i>

GA-15: Networks and Routing

Chair: Gary Lamont

Grand Ballroom	■16:00	Intelligent Exploration for Genetic Algorithms <i>Heni Ben Amor, Achim Rettinger</i>
	■16:30	A Genetic Algorithm for Unmanned Aerial Vehicle Routing <i>Matthew Russell, Gary Lamont Lamont</i>
	■17:00	Improving EAX with Restricted 2-opt <i>Chen-hsiung Chan, Sheng-An Lee, Huai-Kuang Tsai, Cheng-Yan Kao</i>

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