ALIFE9 Program

Sunday 12th September

	Workshops and Tutorials
9:00	**Coffee**
9:30-12:30	*Workshop on Self-Organization and Development in Artificial and Natural Systems* - Sanjeev Kumar
	Workshop on Artificial Chemistry and Its Applications – Hideaki Suzuki and Tim Hutton
	Workshop on Rethinking Life: Scientific and Philosophical Perspectives -Mark Bedau
	Tutorial: Robot? A Word and a Machine in the World - Jana Horáková and Jozef Kelemen
	Tutorial: Evolution of Sensors - Daniel Polani
12:30	**Break**
1:30	**Coffee**
2:00-5:00	*Workshop on Self-Organization and Development in Artificial and Natural Systems* - Sanjeev Kumar
	Workshop on Artificial Chemistry and Its Applications – Hideaki Suzuki and Tim Hutton
	Workshop on Rethinking Life: Scientific and Philosophical Perspectives -Mark Bedau
	Tutorial: Life as it is? Population genetics basics for evolutionary computation experts. - Richard A. Watson and Daniel M. Weinreich
	Tutorial: Introduction to Random Boolean Networks -Carlos Gershenson andAndrew Wuensche
	Tutorial: The Quantum Coreworld - Alexander (Sasha) Wait
5:00	**Break**
6:00	**Stephen Wolfram, Wolfram Research** ***A New Kind of Science & the Future of Artificial Life***
7:00-10:00	**Opening Reception**

Monday 13th September

8:45	Opening Remarks
9:00	**George M. Whitesides, Harvard University** ***Emergence in Synthetic Systems***
10:00	**Coffee**
	Development, evolution and self-organization
10:30	*Tim Taylor*, University of Edinburgh, Redrawing the Boundary between Organism and Environment (Page 268)
10:45	*George Kampis & Gulyas Laszlo*, Eotvos University, Sustained Evolution from Changing Interaction (Page 328)
11:00	*Matthew Bardeen*, Sussex University, The value of death: A lesson from Daisyworld (Page 292)
11:15	*Chrisantha Fernando & Ezequiel Di Paolo*, Sussex University, The Chemoton: A Model for the Formation of Long RNA Templates (Page 1)
11:30	*Efstathios Mytilinaios, David Marcus, Mark Desnoyer & Hod Lipson*, Cornell University, Designed and Evolved Blueprints For Physical Self-Replicating Machines (Page 15)
11:45	*Barry Drennan & Randall Beer*, Case Western Reserve University, A Model for Exploring Genetic Control of Artificial Amoebae (Page 381)
12:00	*Paul Dwight Kuo & Wolfgang Banzhaf* , Memorial University of Newfoundland, Small World and Scale-Free Network Topologies in an Artificial Regulatory Network (Page 404)
12:15	*Keisuke Suzuki & Takashi Ikegami*, University of Tokyo, Self-repairing and Mobility of a Simple Cell (Page 421)

12:30	**Lunch**	
2:00-3:30	**Robotic Studies**	**Evolution & Adaptation I**
2:00	*Emmet Spier*, Sussex University, Behavioural Categorisation: Behaviour makes up for bad vision (Page 133)	*Dusan Misevic, Richard Lenski & Charles Ofria*, Michigan State University, Sexual reproduction and Muller's ratchet in digital organisms (Page 340)
2:30	*Eric Vaughan, Ezequiel Di Paolo & Inman Harvey*, Sussex University, The Evolution of Control and Adaptation in a 3D Powered Passive Dynamic Walker (Page 139)	*Sherri Goings, Jeff Clune, Charles Ofria & Robert T. Pennock*, Michigan State University, Kin Selection: The Rise and Fall of Kin-Cheaters (Page 303)
3:00	*Thomas Howsman, Daniel ONeil & Michael Craft*, Dynamic Concepts/NASA, A Stigmergic Cooperative Multi-Robot Control Architecture (Page 88)	*Wei Huang, Charles Ofria & Eric Torng*, Michigan State University, Measuring Biological Complexity in Digital Organisms (Page 315)
3:30	**Coffee**	
4:00	**Poster Elevator Pitches** **(1 minute Oral Presentations)**	
5:00	**FREE EVENING**	

Tuesday 14th September

9:00	**Satoshi Murata, Tokyo Institute of Technology.** ***Self-Reconfigurable Robot --- A Platform of Evolutionary Robotics***	
10:00	**Coffee**	
	Robot and Agent Studies	
10:30	*Josh Bongard & Hod Lipson*, Cornell University, Once More Unto the Breach: Co-evolving a Robot and its Simulator (Page 57)	
10:45	*Ian Macinnes & Ezequiel Di Paolo*, Sussex University, Crawling Out of the Simulation: Evolving Real Robot Morphologies Using Cheap, Reusable Modules (Page 94)	
11:00	*Evan Malone & Hod Lipson*, Cornell University, Functional Freeform Fabrication for Physical Artificial Life (Page 100)	
11:15	*Thomas Buehrmann & Ezequiel Di Paolo*, Sussex University, Closing the loop: Evolving a model-free visually guided robot arm (Page 63)	
11:30	*Yoon Sik Shim, Sun Jeong Kim & Chang Hun Kim*, Korea University, Evolving Flying Creatures with Path Following Behaviors (Page 125)	
11:45	*Gentaro Morimoto & Takashi Ikegami*, University of Tokyo, Evolution of Plastic Sensory-motor Coupling and Dynamical Categorization (Page 188)	
12:00	*Terry Van Belle & David Ackley*, University of New Mexico, Imitation and Inequity in Avoiding the Tragedy of the Commons (Page 274)	
12:15	*Jason Noble & Manuel de Pinedo*, Leeds University, Mechanistic and ecological explanations in agent-based models of cognition (Page 528)	
12:30	**Lunch**	
	Evolution & Adaptation II	**Artificial Chemistry I**
2:00	*Eduardo Izquierdo-Torres*, Sussex University, The Role of Nearly Neutral Mutations in the Evolution of Dynamical Neural Networks (Page 322)	*Barak Shenhav, Ran Kafri & Doron Lancet* , The Weizmann Institute, Graded Artificial Chemistry in Restricted Boundaries (Page 501)
2:30	*Reiji Suzuki & Takaya Arita*, Nagoya University, Drastic Changes in Roles of Learning in the Course of Evolution (Page 369)	*Chris Salzberg, Hiroki Sayama & Takashi Ikegami*, Tokyo University, A Tangled Hierarchy of Graph- Constructing Graphs (Page 495)
3:00	*Alexandra Penn & Inman Harvey*, Sussex University, The Role of Non-Genetic Change in the heritability, Variation and Response to Selection of Artificially-Selected Ecosystems (Page 352)	*Juan-Carlos Letelier, Jorge Soto-Andrade, Flavio Guíñez-Abarzúa, Athel Cornish-Bowden & María-Luz Cárdenas*, Universidad de Chile, Metabolic closure in (M,R) Systems (Page 450)
3:30	**Coffee**	

Tuesday 14th September (Continued)

	Games and Automata	Language, Cognition & Information
4:00	*Patrick Grim, Evan Selinger, William Braynen, Robert Rosenberger, Randy Au, Nancy Louie & John Connolly* SUNY and Rochester Inst. Tech., Reducing Prejudice: A Spatialized Game-Theoretic Model for the Contact Hypothesis (Page 244)	*Luc Steels*, Sony/Univeristy of Brussels, Analogies between Genome and Language Evolution (Page 200)
4:30	16:30. *Pablo Funes, Belinda Orme & Eric Bonabeau*, Icosystem Corp., Shaping collective behavior: an exploratory design approach (Page 232)	*Elhanan Borenstein & Eytan Ruppin*, Tel Aviv University, Evolving Imitating Agents and the Emergence of a Neural Mirror System (Page 146)
5:00	*Tim Taylor*, Edinburgh University, Niche Construction and the Evolution of Complexity (Page 375)	*Alexander Klyubin, Daniel Polani & Chrystopher Nehaniv*, University of Hertfordshire, Tracking Information Flow through the Environment: Simple Cases of Stigmergy (Page 563)
5:30	**Break**	
6:30-10:30	**Welcoming Remarks: Eric Bonabeau, ICOSYSTEM** **POSTER GALA RECEPTION**	

Wednesday 15th September

9:00	**Eors Szathmary, University of Budapest** ***Origin and Evolution of Various Genetic Systems***	
10:00	**Coffee**	
	Chemistry, Automata and Communication	
10:30	*Barak Naveh, Moshe Sipper, Doron Lancet & Barak Shenhav*, Ben-Gurian University, Lipidia: An Artificial Chemistry of Self-Replicating Assemblies of Lipid-like Molecules (Page 466)	
10:45	*Duraid Madina & Takashi Ikegami,* Univ. New South Wales, Univ. Tokyo, Cellular Formation in a 3D Molecular Dynamics System with Chemistry (Page 461)	
11:00	*Hugues Bersini,* Universite Libre de Bruxelles, Whatever emerges should be intrinsically useful (Page 226)	
11:15	*Chris Salzberg, Antony Antony & Hiroki Sayama,* University Tokyo, University Amsterdam, Complex genetic evolution of self-replicating loops (Page 262)	
11:30	*Andrew Wuensche*, Self-reproduction by glider collisions: the beehive rule (Page 286)	
11:45	*Daniel Roggen, Yann Thoma & Eduardo Sanchez*, EPFL, An Evolving and Developing Cellular Electronic Circuit (Page 33)	
12:00	*Edgar E. Vallejo & Charles E. Taylor*, Tecnologico de Monterrey, UCLA, The Effects of Learning on the Evolution of Saussurean Communication (Page 208)	
12:15	*Kazutoshi Sasahara & Takashi Ikegami,* Tokyo University, Song Grammars as Complex Sexual Displays (Page 194)	
12:30	**Lunch**	
	Evolution & Adaptation III	**Artificial Chemistry II**
2:00	*Inman Harvey*, Sussex University, Homeostasis and Rein Control: From Daisyworld to Active Perception (Page 309)	*Alan Hampton & Christoph Adami*, CalTech, Evolution of robust developmental neural networks (Page 438)
2:30	*Russell Standish***,** University of New South Wales, Ecolab, Webworld and self-organisation (Page 358)	*Tim Hutton*, UCL, Functional Self-Reproducing Cell in a Two-Dimensional Artificial Chemistry (Page 444)
3:00	15:00. *Josh Mitteldorf*, Temple University, Chaotic Population Dynamics and the Evolution of Aging (Page 346)	*Kristian Lindgren, Anders Eriksson & Karl-Erik Eriksson*, Chalmers University, Flows of information in spatially extended chemical dynamics (Page 456)
3:30	**Coffee & Farewell**	
4:00	ISAL Board Meeting	

Posters

1. *Connecting transistors and proteins*
   Claudio Mattiussi & Dario Floreano (Page 9)
2. *Emergent Robustness and Self-Repair through Developmental Cellular System*
   Can Özturkeri & Mathieu Capcarrere (Page 21)
3. *On Self-referential Shape Replication in Robust Aerospace Vehicles*
   Mikhail Prokopenko & Peter Wang (Page 27)
4. *An Environment for Simulating Kinematic Self-Replicating Machines*
   William Stevens (Page 39)
5. *Towards an evolutionary-developmental approach for real-world substrates*
   Shivakumar Viswanathan & Jordan Pollack (Page 45)
6. *Stepwise evolution of molecular biological coding*
   Peter Wills (Page 51)
7. *Performance evaluation of neural architectures for sequential tasks*
   Genci Capi & Kenji Doya (Page 69)
8. *Evolving Plastic Neural Controllers stabilized by Homeostatic Mechanisms for Adaptation to a Perturbation*
   Thierry Hoinville & Patrick Hénaff (Page 81)
9. *Quadrupedal Locomotion: GasNets, CTRNNs and Hybrid CTRNN/PNNs Compared*
   Gary McHale & Phil Husbands (Page 106)
10. *Evolving Simulated Mutually Perceptive Creatures for Combat*
    Michael O'Kelly & Kaijen Hsiao (Page 113)
11. *Information Trade-Offs and the Evolution of Sensory Layouts*
    Lars Olsson, Chrystopher L. Nehaniv & Daniel Polani (Page 119)
12. *A Comparison of Population Learning and Cultural Learning in Artificial Life Societies*
    Dara Curran & Colm O'Riordan (Page 152)
13. *A Computation Framework to Simulate the Coevolution of Language and Social Structure*
    Tao Gong, Jinyun Ke, Minett James & William S-Y Wang (Page 158)
14. *Boom and Bust: Environmental Variability Favors the Emergence of Communication*
    Patrick Grim & Trina Kokalis (Page 164)
15. *Expressing and Understanding Desires in Language Games*
    Michael Klein, Hans Kamp, Guenther Palm & Kenji Doya (Page 170)
16. *The Evolution of Affect Related Displays, Recognition and Related Strategies*
    Robert Lowe, Lola Cañamero, Chrystopher Nehaniv & Daniel Polani (Page 176)
17. *Language, Altruism and Docility: How Cultural Learning Can Favour Language Evolution*
    Marco Mirolli & Domenico Parisi (Page 182)
18. *Minimum cost and the emergence of the Zipf-Mandelbrot law*
    Paul Vogt (Page 214)
19. *Modeling Multicellular and Tumorous Existence with Genetic Cellular Automata*
    Armand Bankhead III, Robert B. Heckendorn & Nancy Magnuson (Page 220)
20. *Updating Schemes in Random Boolean Networks: Do They Really Matter?*
    Carlos Gershenson (Page 238)
21. *Quasi-Stable States in the Iterated-Prisoner's Dilemma*
    Philip Mueller (Page 250)
22. *Evolving Memory: Logical Tasks for Cellular Automata*
    Luis Mateus Rocha (Page 256)
23. *The Quantum Coreworld: Competition and Cooperation in an Artificial Ecology*
    Alexander Wait (Page 280)

24. *The Flexible Balance of Evolutionary Novelty and Memory in the Face of Environmental Catastrophes*
Andrew Buchanan, Mark Triant & Mark Bedau (Page 297)

25. *See How She Runs: Towards Visualising Artificial Red Queen Evolution*
James Marshall & Simon Tokumine (Page 334)

26. *Tierra's missing neutrality: case solved*
Russell Standish (Page 364)

27. *Asymmetric cell division and its integration with other developmental processes for artificial evolutionary systems*
Peter Eggenberger Hotz (Page 387)

28. *A Functional Model of Cell Genome*
Alessandro Fontana & Walter Fraccaro (Page 393)

29. *Asynchronous Dynamics of an Artificial Genetic Regulatory Network*
Jennifer Hallinan & Janet Wiles (Page 399)

30. *Inertia of Chemotactic Motion as an Emergent Property in a Model of a Eukaryotic Cell*
Shin Nishimura & Maaski Sasai (Page 410)

31. *Phenotypic Variability in Canalized Developmental Systems*
Sean Psujek & Randall Beer (Page 415)

32. *Evaluating an Evolutionary Approach for Reconstructing Gene Regulatory Networks*
Dion Whitehead, Andre Skusa & Paul Kennedy (Page 427)

33. *Bonding as an Emergent Phenomenon in an Abstract Artificial Chemistry*
Dominique Chu & Rune Vaboe (Page 433)

34. *Towards the Simulation of Reaction Networks in Astrochemistry*
Pierre Philippe, David Weiss Solis, Tom Lenaerts & Hugues Bersini (Page 472)

35. *Homochirality as Fixed Point of Prebiotic Chemistry*
Raphaël Plasson, Hugues Bersini & Auguste Commeyras (Page 478)

36. *An Evolvable Artificial Chemistry Featuring Continuous Physics and Discrete Reactions*
Thomas Portegys (Page 484)

37. *The Role of RNA Editing in Dynamic Environments*
Luis Mateus Rocha & Chien-feng Huang (Page 489)

38. *Spacial Representation for Artificial Chemistry Based on Small-World Networks*
Hideaki Suzuki (Page 507)

39. *Behavioral Adaptive Autonomy. A milestone in the Alife route to AI?*
Xabier Barandiaran (Page 514)

40. *A Physiological Approach to the Generation of Artificial Life Forms*
Marc Cavazza, Simon Hartley, Louis Bec, François Mourre, Gonzague Defos du Rau, Remy Lalanne, Mikael Le Bras & Jen-Luc Lugrin (Page 522)

41. *Empiricism in Artificial Life*
Eric Silverman & Seth Bullock (Page 534)

42. *Using the Universal Similarity Metric to Model Artificial Creativity and Predict Human Listeners Response to Evolutionary Music*
Nils Svangård, Jon Klein & Peter Nordin (Page 540)

43. *Playing music by conducting BOID agents*
Tatsuo Unemi & Daniel Bisig (Page 546)

44. *An Evolutionary Approach to Complex System Regulation Using Grammatical Evolution*
Saoirse Amarteifio & Michael O'Neill (Page 551)

45. *Analyzing Evolved Fault-Tolerant Neurocontrollers*
Alon Keinan (Page 557)

46. *Ant Foraging Revisited*
Liviu Panait & Sean Luke (Page 569)

47. *Learning Ant Foraging Behaviors*
Liviu Panait & Sean Luke (Page 575)

48. *Systems biology thought experiments in human genetics using artificial life and grammatical evolution*
Bill White & Jason Moore (Page 581)