



# 13<sup>th</sup> European conference on Artificial Life

(ECAL 2015)

20–24 July 2015, York, UK

UNIVERSITY *of* York







## Organising Committee

Prof Susan Stepney – General Chair

Prof Jon Timmis – Programme Chair

Dr Paul Andrews – Local Chair

Dr Fiona Polack – Tutorial Chair

Dr Simon Hickinbotham – Workshop Chair

Dr Leo Caves – Special Sessions Chair

Dr Rene Doursat – Education Chair

Dr Tim Taylor – Technical Chair

Mr Bob French – Local Support

Mrs Sarah Christmas – Local Support





## schedule : Monday 20 July

	RCH/037 Lecture theatre	RCH/248 Lakehouse 1	RCH/250 Lakehouse 2	RCH/017 teaching room	RCH/204 seminar room	RCH/103 teaching room
9:00	registration					
10:00	ISAL summer school (start 9:30)	workshop: ITiALife	workshop: SteerComplex and FoCAS	workshop: ToProB	workshop: OEE #1	
10:50	coffee break					
11:20	ISAL summer school (ctd)	workshop: ITiALife (ctd)	workshop: SteerComplex and FoCAS (ctd)	workshop: ToProB (ctd)	workshop: OEE #1 (ctd)	
13:00	lunch break					
14:00	ISAL summer school (ctd)	workshop: PhyChip	workshop: CoSMoS	workshop: ToProB (ctd)	workshop: EvoPhysSys	tutorial: JIDT (start 13:30)
15:30	tea break					
16:00	ISAL summer school (ctd) (until 18:30)	workshop: PhyChip (ctd)	workshop: CoSMoS (ctd)	workshop: ToProB (ctd)	workshop: EvoPhysSys (ctd)	tutorial 19: ICoNMAP (until 18:00)
17:25	close					



## schedule : Tuesday 21 July

	RCH/037 Lecture theatre	RCH/248 Lakehouse 1	RCH/250 Lakehouse 2	RCH/017 teaching room	RCH/204 seminar room
9:00	keynote: Rachel Armstrong				
10:00	Network Theory	In Vitro Systems		workshop: SynNatSys	tutorial: Physarum Machines
10:50	coffee break				
11:20	Evolutionary Dynamics 1	In Materio Systems	Cellular Automata	workshop: SynNatSys (ctd)	tutorial: Physarum Machines (ctd)
13:00	lunch break				
14:00	Evolutionary Dynamics 2	special session: Morphogenetic Engineering 1	special session: Slime Mould Computers	workshop: SynNatSys (ctd)	workshop: SB-AI
15:40	tea break				
16:10	Game Theory and Networks	special session: Morphogenetic Engineering 2	Late breaking papers 1	workshop: SynNatSys (ctd)	workshop: SB-AI (ctd)
17:25	paper sessions close				
17:30	poster video session				
18:00	Welcome Reception and poster display session (atrium)				



## schedule : Wednesday 22 July

	RCH/037 Lecture theatre	RCH/248 Lakehouse 1	RCH/250 Lakehouse 2	RCH/017 teaching room	RCH/204 seminar room
9:00	artist: Andy Lomas				
10:00	Computational Biology	Programming ALife	Behavioural and Evo Robotics 1		tutorial: Statistical Analysis
10:50	coffee break				
11:20	Evolutionary Dynamics 3	Agent Strategies	Communication and Language		tutorial: Statistical Analysis (ctd)
13:00	lunch break				
14:00	conference trip: Castle Howard				
17:00	close				



## schedule : Thursday 23 July

	RCH/037 Lecture theatre	RCH/248 Lakehouse 1	RCH/250 Lakehouse 2	RCH/017 teaching room	RCH/204 seminar room
9:00	keynote: Justin Werfel				
10:00	Collective Behaviours	Shape and Form		workshop: TRUCE	tutorial: Aevol
10:50	coffee break				
11:20	Swarm Intelligence	Artificial Chemistries 1	Learning and Evolutionary Software Systems	workshop: TRUCE (ctd)	tutorial: Aevol (ctd)
13:00	lunch break				
14:00	Social Networks 1	Artificial Chemistries 2	special session: Quantifying Embodiment	workshop: TRUCE (ctd)	tutorial: EvoRobots
15:40	tea break				
16:10	Social Networks 2	Educational Systems		workshop: TRUCE (ctd)	tutorial: EvoRobots (ctd)
17:25	paper sessions close				
17:30	Awards & ISAL mtg				
18:30	close				
19:30	Conference dinner, Railway Museum				





## schedule : Friday 24 July

	RCH/037 Lecture theatre	RCH/248 Lakehouse 1	RCH/250 Lakehouse 2	RCH/017 teaching room	RCH/204 seminar room
9:00	keynote: Paulien Hogeweg				
10:00	Agent Control	Ecosystems	Late breaking papers 2	workshop: EvoEvo	workshop: HieDy
10:50	coffee break				
11:20	Behavioural and Evolutionary Robotics 2	Complexity		workshop: EvoEvo (ctd)	workshop: HieDy (ctd)
13:00	lunch break				
14:00	Behavioural and Evolutionary Robotics 3		Late breaking papers 3	workshop: EvoEvo (ctd)	workshop: HieDy (ctd)
15:40	tea break				
16:10	Agent and Robot Morphologies		Late breaking papers 4	workshop: OEE #2	workshop: HieDy (ctd)
17:25	conference close				





Monday 20 July

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**RCH/037 Lecture theatre**

**ISAL Summer School**

09:30 Welcome and introduction, Rene Doursat

09:40 "Introduction to the Modeling and Analysis of Complex Systems" Hiroki Sayama

11:30 "Autonomic Computing and Self-Adaptive Networks" Ada Diaconescu

14:00 "Historical and Philosophical Perspectives on Artificial Life" Mark Bedau

15:50 "Origins of Life and Protocells" Steen Rasmussen

17:10 "Model Driven Engineering and Biomedical Simulations" Fiona Polack and Louis Rose

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**RCH/248 Lakehouse 1**

10:00 ITiALife workshop

14:00 PhyChip workshop

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**RCH/250 Lakehouse 2**

10:00 SteerComplex/FoCAS workshop

14:00 CoSMoS workshop

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**RCH/017 Teaching Room**

10:00 ToProB workshop

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**RCH/204 Seminar Room**

10:00 OEE #1 workshop

14:00 EvoPhysSys workshop

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**RCH/103 Teaching Room**

13:30 JIDT tutorial

16:00 ICoNMAP tutorial



**Tuesday 21 July**

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**Tuesday 21 July 9:00**

**RCH/037 Lecture theatre**

**keynote:** Rachel Armstrong: Design Thinking for Origins of Life studies

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**Tuesday 21 July 10:00**

**RCH/037 Lecture theatre**

**Network Theory** (chair: Hiroki Sayama)

10:00 **38** "Contagion on Networks with Self-Organised Community Structure" Alberto Antonioni, Seth Bullock, Christian Darabos, Mario Giacobini, Bryan Iotti, Jason Moore and Marco Tomassini

10:25 **95** "Planarity as a driver of Spatial Network structure" Garvin Haslett and Markus Brede

**RCH/248 Lakehouse 1**

**In Vitro Systems** (chair: Yutetsu Kuruma)

10:00 **28** "Ribosome synthesis and construction of a minimal cell using a cell-free expression platform" Filippo Caschera

10:25 **45** "Embodied Evolution of Artificial Cells in a Hybrid Wet/Hard-ware Platform" Leroy Cronin and Juan Manuel Parrilla Gutierrez

**RCH/017 Teaching Room**

10:00 SynNatSys workshop

**RCH/204 Seminar Room**

10:00 Physarum Machines tutorial

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**Tuesday 21 July 11:20**

**RCH/037 Lecture theatre**

**Evolutionary Dynamics 1** (chair: Olaf Witkowski)

- 11:20 **52** "Evolving strategies for single-celled organisms in multi-nutrient environments" Dominique Chu and David Barnes
- 11:45 **99** "Epigenetic inheritance speeds up evolution of artificial organisms" Yoram Vadée-Le-Brun, Jonathan Rouzaud-Cornabas and Guillaume Beslon
- 12:10 **122** "Recombination Is Surprisingly Constructive for Artificial Gene Regulatory Networks in the Context of Selection for Developmental Stability" Yifei Wang, Yinghong Lan, Daniel Weinreich, Nicholas Priest and Joanna Bryson
- 12:35 **141** "A Metamodel for the Evolution of Evolution" Paul Andrews and Susan Stepney

**RCH/248 Lakehouse 1**

**In Materio Systems** (chair: Julian Miller)

- 11:20 **21** "Evolving Robot Controllers Using Carbon Nanotubes" Maktuba Mohid and Julian Miller
- 11:45 **97** "Simulating self-replicating, chemically immersed, microchip swarms" Uwe Tangen, Harold Fellermann and Steen Rasmussen
- 12:10 **104** "Autonomous lablet locomotion and active docking by sensomotoric electroosmotic drive." John McCaskill, Abhishek Sharma and Thomas Maeke
- 12:35 **113** "An Investigation of Square Waves for Evolution in Carbon Nanotubes Material" Odd Rune Lykkebø, Stefano Nichele and Gunnar Tufte

**RCH/250 Lakehouse 2**

**Cellular Automata** (chair: Dave Ackley)

- 11:20 **32** "Practical Fault Tolerant 2D Cellular Automata" Steven Janke and Matthew Whitehead
- 11:45 **116** "Evolutionary Progress in Heterogenous Cellular Automata (HetCA)" David Medernach, Jeannie Fitzgerald, Simon Carrignon and Conor Ryan
- 12:10 **123** "Searching for non-regular neighborhood cellular automata rules applied to scheduling task and guided by a forecast dynamical behavior parameter " Tiago I. Carvalho and Gina M. B. Oliveira

**RCH/017 Teaching Room**

- 11:20 SynNatSys workshop (ctd)

**RCH/204 Seminar Room**

- 11:20 Physarum Machines tutorial (ctd)

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**Tuesday 21 July 14:00**

**RCH/037 Lecture theatre**

**Evolutionary Dynamics 2** (chair: Barry McMullin)

14:00 **26** "Where Does (Co)evolution Lead to?" Jan Paredis

14:25 **111** "How Much Should You Select for Evolvability?" Andrew Webb, Joshua Knowles and Julia Handl

14:50 **117** "Simpson's Paradox, Cooperation and Individuality in Bacterial Biofilms " Alexandra Penn

15:15 **135** "Does self-replication imply evolvability?" Thomas Labar, Christoph Adami and Arend Hintze

**RCH/248 Lakehouse 1**

**Special Session – Morphogenetic Engineering 1** (chair: Rene Doursat)

14:00 **56** "Behavioral Diversities of Morphogenetic Collective Systems" Hiroki Sayama

14:25 **80** "Morphogenesis and Replication of Multi-Cellular Organisms with Evolved Variable Length Self-Modifying Genomes" Stefano Nichele and Gunnar Tufte

14:50 **90** "Modelling the Role of Trail Pheromone in the Collective Construction of Termite Royal Chambers" Nicholas Hill and Seth Bullock

15:15 **91** "From tadpole to frog: artificial metamorphosis as a method of evolving self-reconfiguring robots" Michal Joachimczak, Reiji Suzuki and Takaya Arita

**RCH/250 Lakehouse 2**

**Special Session – Slime Mould Computers** (chair: Andy Adamatzky)

14:00 **6** "Physarum Polycephalum changes polyaniline properties" Alice Dimonte, Tatiana Berzina and Victor Erokhin

14:25 **16** "Majority Gates and Circular Computation in Slime Mould" Genaro Martinez, Andrew Adamatzky, Richard Mayne, Fangyue Chen and Qinbin He

14:50 **17** "Slime mould actin sensoriaction networks: topology and dynamic transformations" Richard Mayne and Andy Adamatzky

15:15 **148** "Mimicking the Exploration of 3D Terrains by Physarum with Cellular Automata Models" Michail-Antisthenis I. Tsompanas and Georgios Ch. Sirakoulis

**RCH/017 Teaching Room**

14:00 SynNatSys workshop (ctd)

**RCH/204 Seminar Room**

14:00 SB-AI workshop

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**Tuesday 21 July 16:10**

**RCH/037 Lecture theatre**

**Game Theory and Networks** (chair: Lance Williams)

- 16:10 **61** "Coevolution of cooperation and layer selection strategies in multiplex networks" Katsuki Hayashi, Reiji Suzuki and Takaya Arita
- 16:35 **65** "The Evolution of Assortment with Multiple Simultaneous Games" Simon Tudge, Adam Jackson, Richard Watson and Markus Brede
- 17:00 **22** "A Minimal Model for the Emergence of Cooperation in Networks" Steve Miller and Joshua Knowles
- 17:30 ALife 2016, ECAL 2017 announcements; poster video blitz

**RCH/248 Lakehouse 1**

**Special Session – Morphogenetic Engineering 2** (chair: Hiroki Sayama)

- 16:10 **102** "Partial Redundancy and Morphological Homeostasis: Reliable Development through Overlapping Mechanisms" Micah Brodsky
- 16:35 **121** "MecaCell: an Open-source Efficient Cellular Physics Engine" Jean Disset, Sylvain Cussat-Blanc and Yves Duthen

**RCH/250 Lakehouse 2**

**Late breaking papers 1** (chair: Martyn Amos)

- 16:10 **153** "Logical gates by glider-gun dynamics – the X-rule" Andrew Wuensche and José Manuel Gómez Soto
- 16:35 **154** "Pedestrian Behavior Mining from Data" Juan Galán-Páez and Joaquín Borrego-Díaz
- 17:00 **160** "Maze Navigation and Memory with Physical Reservoir Computers" Chris Johnson, Andrew Philippides and Philip Husbands

**RCH/017 Teaching Room**

- 16:10 SynNatSys workshop (ctd)

**RCH/204 Seminar Room**

- 16:10 SB-AI workshop (ctd)

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**Tuesday 21 July 18:00**

**Atrium**

**Poster Session**

- 4** "Dynamic Homeostasis in Packet Switching Networks" Mizuki Oka, Hirotake Abe and Takashi Ikegami
- 35** "Evolving Collective Behaviors With Diverse But Predictable Sensor States" Payam Zahadat, Heiko Hamann and Thomas Schmickl
- 64** "Investigating a cellular automata model that performs three distance diffusion on a robot path planning" Gina M. B. Oliveira, Patricia A. Vargas and Giordano Ferreira
- 71** "Incorporation of Emotions in the Orphibs' Agent Architecture" Nuno Barreto, Luis Macedo, Penousal Machado and Licínio Roque
- 74** "Time Series Evolution for Integrating Developmental Processes" Sebastian von Mammen and Melanie Däscher
- 87** "Toward a behavior-based approach to the origins of life and the genetic system" Tom Froese
- 98** "Do it yourself (DIY) liquid handling robot for evolutionary search exploration" Asbjørn Müller, Aleksandra Amaldass, Kliment Yanev and Steen Rasmussen
- 100** "Probing models of minimal swimming vehicules in vivo with microalgae phototaxis." Colliaux David, Lia Giraud, Claude Yéprémian, Pierre Bessièrè and Jacques Droulez
- 105** "A Predator-Prey Scenario in a Virtual Ecosystem" Nesrine Ouannes, Nouredine Djedi, Hervé Luga and Yves Duthen
- 115** "Apparent action and apparent goal-directedness" Martin Biehl and Daniel Polani
- 145** "Simulating the Influence of Diet on the Intestinal Microbiome Composition" Mark Read, Andrew Holmes, Madison Hartill-Law, Samantha Solon-Biet, David Raubenheimer and Stephen Simpson
- 147** "Evolutionary change precedes extinction in eco-evolutionary dynamics based on a 3D virtual predator-prey system" Takashi Ito, Marcin L. Pilat, Reiji Suzuki and Takaya Arita





Wednesday 22 July

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**Wednesday 22 July 9:00**

**RCH/037 Lecture theatre**

**artist:** Andy Lomas: Hybrid Forms

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**Wednesday 22 July 10:00**

**RCH/037 Lecture theatre**

**Computational Biology** (chair: Jon Timmis)

10:00 **144** "Simulation-Based Analysis of In Situ Cellular Motility" Mark Read, Jon Timmis and Tatyana Chtanova

10:25 **151** "An Agent-Based Model of Avascular Tumor Growth" Ana Victoria Ponce Bobadilla, Rene Doursat and Francois Amblard

**RCH/248 Lakehouse 1**

**Programming ALife** (chair: Soichiro Tsuda)

10:00 **31** "Programs as Polypeptides" Lance Williams

10:25 **126** "Artificial life programming in the robust-first attractor" David Ackley and Elena Ackley

**RCH/250 Lakehouse 2**

**Behavioural and Evolutionary Robotics 1** (chair: John Rieffel)

10:00 **73** "Cooperative Coevolution of Morphologically Heterogeneous Robots" Jorge Gomes, Pedro Mariano and Anders Christensen

10:25 **112** "Evolution of Cooperation in Evolutionary Robotics : The Tradeoff Between Evolvability and Efficiency" Arthur Bernard, Jean-Baptiste André and Nicolas Bredeche

**RCH/204 Seminar room**

10:00 Statistical Analysis tutorial

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**Wednesday 22 July 11:20**

**RCH/037 Lecture theatre**

**Evolutionary Dynamics 3** (chair: Guillaume Beslon)

- 11:20 **57** "Emergence-focused design in complex system simulation" Chris Marriott and Jobran Chebib  
11:45 **67** "Environmental bias forces parasitism in Tierra" Simon Hickinbotham and Susan Stepney  
12:10 **70** "Unraveling the genotype-phenotype map of evolving digital organisms" Miguel Fortuna, Luis Zaman, Charles Ofria and Andreas Wagner  
12:35 **142** "Informational parasites in code evolution" Andres Burgos and Daniel Polani

**RCH/248 Lakehouse 1**

**Agent Strategies** (chair: Justin Werfel)

- 11:20 **62** "Volatility and spatial distribution of food resources determine ant foraging strategies" Drew Levin, Joshua Hecker, Melanie Moses and Stephanie Forrest  
11:45 **76** "Following Strategies Reduces Accidents, but Makes Outcomes Worse: Evidence from Simulated Treefrog Mating Scenarios" Giordano Ferreira and Matthias Scheutz  
12:10 **81** "The Hunger Games: Embodied agents evolving foraging strategies on the frugal-greedy spectrum" Nathanael Aubert-Kato, Olaf Witkowski and Takashi Ikegami  
12:35 **140** "Evolving an optimal group size in groups of prey under predation" Patrick Haley, Randal Olson, Fred Dyer and Christoph Adami

**RCH/250 Lakehouse 2**

**Communication and Language** (chair: Takaya Arita)

- 11:20 **79** "Achieving Compositional Language in a Population of Iterated Learners" Lewys Brace, Seth Bullock and Jason Noble  
11:45 **109** "How to play the Syntax Game" Luc Steels and Emilia Garcia-Casademont  
12:10 **125** "Investigating the Impact of Communication Quality on Evolving Populations of Artificial Life Agents" Sadat Chowdhury and Elizabeth Sklar  
12:35 **132** "How Intrinsic Motivation can Speed Up Language Emergence" Miquel Cornudella, Paul Van Eecke and Remi van Trijp

**RCH/204 Seminar room**

- 11:20 Statistical Analysis tutorial (ctd)

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**Wednesday 22 July 14:00**

- 14:00 Conference trip: Castle Howard



Thursday 23 July

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**Thursday 23 July 9:00**

**RCH/037 Lecture theatre**

**keynote:** Justin Werfel: Termite-inspired robots and evolved death: environmentally-mediated coordination in artificial and natural systems

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**Thursday 23 July 10:00**

**RCH/037 Lecture theatre**

**Collective Behaviours: Thursday 23 July 10:00** (chair: Jeff Jones)

10:00 **5** "How social networks shape collective behaviours" Daniel Franks, Jamie Wood and Nikolai Bode

10:25 **133** "Coordination of collective behaviours in spatially separated agents" Rob Mills, Payam Zahadat, Fernando Silva, Damjan Mlikic, Pedro Mariano, Thomas Schmickl and Luís Correia

**RCH/248 Lakehouse 1**

**Shape and Form: Thursday 23 July 10:00** (chair: Andy Wuensche)

10:00 **23** "The Kinetic Basis of Morphogenesis" Yuri Shalygo

10:25 **152** "Spatial Computing in Synthetic Bioware: Creating Bacterial Architectures" Jonathan Pascalie, Martin Potier, Taras Kowaliw, Jean-Louis Giavitto, Olivier Michel, Antoine Spicher and Rene Doursat

**RCH/017 Teaching Room**

10:00 TRUCE workshop

**RCH/204 Seminar room**

10:00 Aevol tutorial

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**Thursday 23 July 11:20**

**RCH/037 Lecture theatre**

**Swarm Intelligence** (chair: TBD)

- 11:20 **44** "CriPS: Critical Particle Swarm Optimisation" Adam Erskine and Michael Herrmann
- 11:45 **68** "Distributed vs. Centralized Particle Swarm Optimization for Learning Flocking Behaviors" Iñaki Navarro, Ezequiel Di Mario and Alcherio Martinoli
- 12:10 **88** "An Efficient Ant Colony System for Edge Detection in Image Processing" Yara Khaluf and Syam Gullipalli
- 12:35 **103** "Towards Failure-Resistant Mobile Distributed Systems Inspired by Swarm Intelligence and Trophallaxis" Arles Rodriguez, Jonatan Gomez and Ada Diaconescu

**RCH/248 Lakehouse 1**

**Artificial Chemistries 1** (chair: Takashi Ikegami)

- 11:20 **27** "A New View of Protocell Metabolism" Ben Shirt-Ediss, Ricard Solé and Kepa Ruiz-Mirazo
- 11:45 **46** "Ontogeny and adaptivity in a model protocell" Eran Agmon, Alexander Gates and Randall Beer
- 12:10 **49** "Chemical Architectures for Self-Replicating Proto-Cells" Erwan Bigan, Jean-Marc Steyaert and Stéphane Douady
- 12:35 **94** "Emergence of Competition between Different Dissipative Structures for the Same Free Energy Source" Stuart Bartlett and Seth Bullock

**RCH/250 Lakehouse 2**

**Learning and Evolutionary Software Systems** (chair: Neil Vaughan)

- 11:20 **37** "Learning by Stimulation Avoidance as a Primary Principle of Spiking Neural Networks Dynamics" Lana Sinapayen, Atsushi Masumori, Nathaniel Virgo and Takashi Ikegami
- 11:45 **82** "Wallace: An efficient generic evolutionary framework" Christopher Steven Timperley and Susan Stepney
- 12:10 **134** "Corpus-taught Evolutionary Music Composition" Csaba Sulyok, Christopher Harte and Andrew McPherson
- 12:35 **149** "Optimal Mutation Rate Control under Selection in Hamming Spaces" Elizabeth Aston, Alastair Channon, Roman Belavkin, Rok Krasovec and Christopher Knight

**RCH/017 Teaching Room**

- 11:20 TRUCE workshop (ctd)

**RCH/204 Seminar room**

- 11:20 Aevol tutorial (ctd)

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**Thursday 23 July 14:00**

**RCH/037 Lecture theatre**

**Social networks 1** (chair: Seth Bullock)

14:00 **3** "Modelling Conflict within the Social Networks of Large Multi-Vendor Software Projects using Communicating Stream X-Machines" Richard Williams

14:25 **8** "At the root of sociality: Working towards emergent, permanent, social affines" Ovi Chris Rouly

14:50 **40** "Human Swarms, a real-time method for collective intelligence" Louis Rosenberg

15:15 **119** " Emergent Robustness in Software Systems through Decentralized Adaptation: an Ecologically-Inspired ALife Approach" Franck Fleurey, Benoit Baudry, Benoit Gauzens, André Elie and Kwaku Yeboah-Antwi

**RCH/248 Lakehouse 1**

**Artificial Chemistries 2** (chair: Uwe Tangen)

14:00 **19** "Conservation of Matter Increases Evolutionary Activity" Simon Hickenbotham and Susan Stepney

14:25 **60** "The Lattice of Chemical Organisations" Pietro Speroni di Fenizio

14:50 **75** "Heredity in Messy Chemistries" Nathaniel Virgo and Nicholas Guttenberg

15:15 **130** "Achieving Closure in Enzymes in Artificial Chemistries" Matteo Monti, Tim Hutton and Piet Hut

**RCH/250 Lakehouse 2**

**Special Session – Quantifying Embodiment** (chair: Christoph Salge)

14:00 **33** "Musculo-Skeletal Models as Tools to Quantify Embodiment" Daniel F. B. Haeufle, Michael Günther and Syn Schmitt

14:25 **39** "Task Dynamics & the (Ecological) Information They Create" Andrew Wilson and Sabrina Golonka

14:50 **48** "Quantifying Morphological Computation based on an information decomposition of the sensorimotor loop" Keyan Ghazi-Zahedi and Johannes Rauh

15:15 **106** "Quantifying Self-Organizing Behavior of Autonomous Robots" Georg Martius and Eckehard Olbrich

**RCH/017 Teaching Room**

14:00 TRUCE workshop (ctd)

**RCH/204 Seminar room**

14:00 EvoRobots tutorial

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**Thursday 23 July 16:10**

**RCH/037 Lecture theatre**

**Social networks 2** (chair: Seth Bullock)

- 16:10 **24** "Environmental Factors and the Emergence of Cultural – Technical Innovations" Peter Andras  
16:35 **29** "The Universality of Peer-Influence in Social Networks" Flavio Pinheiro, Marta D. Santos,  
Francisco C. Santos and Jorge M. Pacheco  
17:00 **136** "Effects of Social Network Size and Topology on Evolutionary Decision Making" Hiroki  
Sayama, Shelley Dionne and Francis Yammarino  
17:30 Best paper awards, bursary presentations, ISAL meeting

**RCH/248 Lakehouse 1**

**Educational Systems** (chair: Chris Rouly)

- 16:10 **84** "Omnigram Explorer: A Simple Interactive Tool for the Initial Exploration of Complex Systems"  
Tim Taylor, Alan Dorin and Kevin Korb  
16:35 **86** "The Digital Aquarist: An Interactive Ecology Simulator" Julian Schikarski, Oliver Meisch, Sarah  
Edenhofer and Sebastian von Mammen  
17:00 **93** "The Overshoot Curriculum: Artificial Life, Education and the Human Predicament" Barry  
McMullin

**RCH/017 Teaching Room**

- 16:10 TRUCE workshop (ctd)

**RCH/204 Seminar room**

- 16:10 EvoRobots tutorial (ctd)

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**Thursday 23 July 19:30**

- 19:30 Conference dinner: National Railway Museum



Friday 24 July

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Friday 24 July 9:00

**RCH/037 Lecture theatre**

**keynote:** Paulien Hogeweg: Non-random random mutations: a signature of evolution of evolution (EVOEVO)

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Friday 24 July 10:00

**RCH/037 Lecture theatre**

**Agent Control** (chair: Georg Martius)

10:00 **43** "An Integrated Neuromechanical Model of Steering in *C. elegans*" Eduardo J. Izquierdo and Randall D. Beer

10:25 **77** "Incremental Neuroevolution of Reactive and Deliberative 3D Agents" Adam Stanton and Alastair Channon

**RCH/248 Lakehouse 1**

**Ecosystems** (chair: Alex Penn)

10:00 **9** "The Circular Logic of Gaia: Fragility and Fallacies, Regulation and Proofs" Inman Harvey

10:25 **139** "Cascading Transitions in Coupled Complex Ecosystems" Iain Weaver

**RCH/250 Lakehouse 2**

**Late breaking papers 2** (chair: TBD)

10:00 **159** "An open-ended evolution in a web system" Mizuki Oka, Yasuhiro Hashimoto and Takashi Ikegami

10:25 **163** "Simulated Robotic Autonomous Agents with Motion Evolution" Neil Vaughan

**RCH/017 Teaching Room**

10:00 EvoEvo workshop

**RCH/204 Seminar room**

10:00 HieDy workshop

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**Friday 24 July 11:20**

**RCH/037 Lecture theatre**

**Behavioural and Evolutionary Robotics 2** (chair: John Rieffel)

- 11:20 **63** "Applying homeostatic neural controller to multi-legged robot and adaptivity to novel disruptions" Hiroyuki Iizuka, Hiroki Nakai and Masahito Yamamoto
- 11:45 **83** "Emergence of Sense-Making Behavior by the Stimulus Avoidance Principle: Experiments on a Robot Behavior Controlled by Cultured Neuronal Cells." Atsushi Masumori, Norihiro Maruyama, Lana Sinapayen, Takeshi Mita, Urs Frey, Douglas Bakkum, Hirokazu Takahashi and Takashi Ikegami
- 12:10 **89** "Abnormality Detection in Robots Exhibiting Composite Swarm Behaviours" Danesh Tarapore, Anders Christensen and Jon Timmis
- 12:35 **107** "Cooperative Object Transport Using Evolutionary Swarm Robotics Methods" Muhanad Mohammed, Chuan Lu and Elio Tuci

**RCH/248 Lakehouse 1**

**Complexity** (chair: TBD)

- 11:20 **50** "A population of information processing objects as a model of evolutionary dynamics" Richard Carter, Stephen Mann and Karoline Wiesner
- 11:45 **66** "Exploring the organisation of complex systems through the dynamical interactions among their relevant subsets" Alessandro Filisetti, Marco Villani, Andrea Roli, Marco Fiorucci and Roberto Serra
- 12:10 **120** "Steering a Complex Adaptive System: a complexity science design methodology applied to an industrial ecosystem in the Humber region, UK" Alexandra Penn
- 12:35 **127** "Towards a methodology for describing the relationship between simulation and reality" Eric Schneider, Elizabeth Sklar, M. Q. Azhar, Simon Parsons and Karl Tuyls

**RCH/017 Teaching Room**

11:20 EvoEvo workshop (ctd)

**RCH/204 Seminar room**

11:20 HieDy workshop (ctd)

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**Friday 24 July 14:00**

**RCH/037 Lecture theatre**

**Behavioural and Evolutionary Robotics 3** (chair: Andrea Roli)

- 14:00 **41** "A Passive Mechanism for Goal-Directed Navigation using Grid Cells" Vegard Edvardsen
- 14:25 **96** "Emotional modulation of peripersonal space impacts the way robots interact" Marwen Belkaid, Nicolas Cuperlier and Philippe Gaussier
- 14:50 **108** "Closed-loop acquisition of behaviour on the Sphero robot" Oswald Berthold and Verena Hafner



## **RCH/250 Lakehouse 2**

### **Late breaking papers 3** (chair: Martin Biehl)

- 14:00 **164** "Reaction-Diffusion Risk: Chemical Signaling in a Conquest Game" Nathanael Aubert and Olaf Witkowski
- 14:25 **155** "Shaping the body to shape the behavior: a more active role of the morphology in the brain-body trade-off" Francesco Corucci, Marcello Calisti, Helmut Hauser and Cecilia Laschi
- 14:50 **157** "Engineering artificial extraterrestrial life?" Alex Ellery
- 15:15 **161** "An unexpected discrepancy in a well-known problem: Kraskov estimators applied to spiking neural networks" Pedro A.M. Mediano and Murray Shanahan

## **RCH/017 Teaching Room**

14:00 EvoEvo workshop (ctd)

## **RCH/204 Seminar room**

14:00 HieDy workshop (ctd)

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## **Friday 24 July 16:10**

## **RCH/037 Lecture theatre**

### **Agent and Robot Morphology** (chair: TBD)

- 16:10 **34** "Evaluating the Effect of a Flexible Spine on the Evolution of Quadrupedal Gaits" Jared Moore, Philip Mckinley and Craig McGowan
- 16:35 **137** "Soft-Body Muscles for Evolved Virtual Creatures: The Next Step on a Bio-Mimetic Path to Meaningful Morphological Complexity" Dan Lessin and Sebastian Risi

## **RCH/250 Lakehouse 2**

### **Late breaking papers 4** (chair: TBD)

- 16:10 **156** "Multi-level evolution, differential gene mobility, and the persistence of population diversity" Bram van Dijk and Paulien Hogeweg
- 16:35 **162** "Analysis of causality network from interactions between nonlinear oscillator networks and musculoskeletal system" Jihoon Park, Hiroki Mori and Minoru Asada
- 17:00 **158** "Thresholding Urban Connectivity by Local Connected Fractal Dimensions and Lacunarity Analyses" Bashar Swaid, Eleonora Bilotta, Pietro Pantano and Roberta Lucente

## **RCH/017 Teaching Room**

16:10 OEE #2 workshop (ctd from Monday)

## **RCH/204 Seminar room**

16:10 HieDy workshop (ctd)

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## Anti-harassment policy for ISAL conferences

This policy is adapted from the example available from the one written and promoted by the Ada Initiative co-founders.

ECAL 2015 is dedicated to providing a harassment-free conference experience for everyone, regardless of gender, sexual orientation, disability, race, or religion. We do not tolerate harassment of conference participants in any form. Sexual language and imagery is not appropriate for any conference venue, including presentations. Conference participants violating these rules may be sanctioned or expelled from the conference at the discretion of the conference organisers.

Harassment includes: offensive verbal comments related to gender, sexual orientation, disability, race, religion; sexual images in public spaces; deliberate intimidation, stalking, following, harassing photography or recording; sustained disruption of talks or other events; inappropriate physical contact; unwelcome sexual attention. Participants asked to stop any harassing behaviour are expected to comply immediately.

We expect participants to follow these rules at all conference venues and conference-related social events.

If a participant engages in harassing behaviour, the conference organisers may take any action they deem appropriate, including warning the offender or expulsion from the conference. If you are being harassed, or notice that someone else is being harassed, or have any other concerns, please contact a member of conference staff immediately.

Conference staff will be happy to help participants contact venue security or local law enforcement, provide escorts, or otherwise assist those experiencing harassment to feel safe for the duration of the conference. We value your attendance.

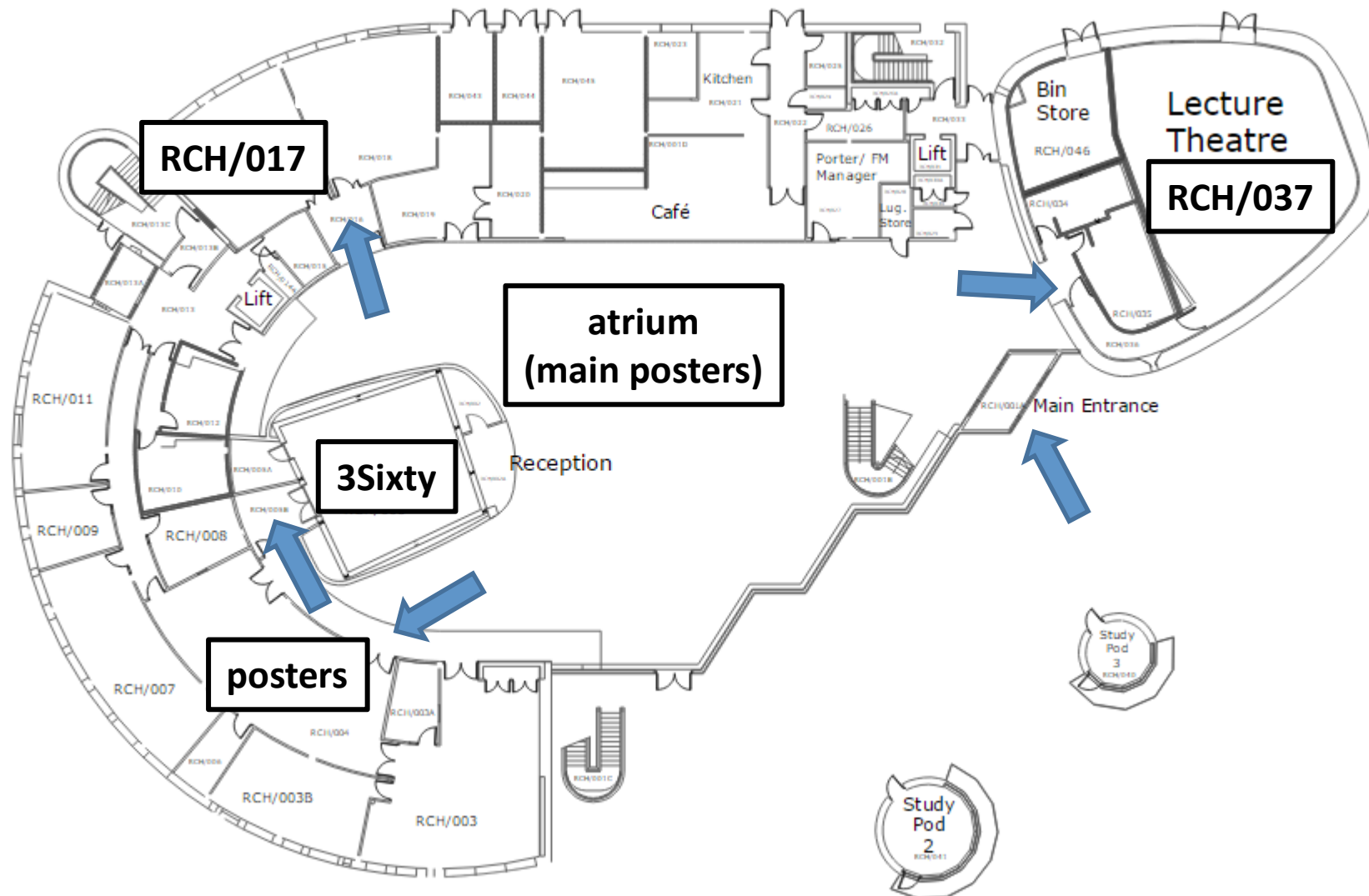
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## Contact details

- Email address for organisers: [ecal2015-management-group@york.ac.uk](mailto:ecal2015-management-group@york.ac.uk)
- Local non-emergency support: go to reception in the Ron Cooke Hub, or call 01904 325120
- If you are using an internal phone: 5120
- Campus security: freephone 0800 43 3333 (urgent) or 01904 32 4444 (non-urgent)
- If you are using an internal phone: 3333 (urgent) or 4444 (non-urgent)
- Emergency medical/fire/police: freephone 0800 43 3333 (campus) or 999 (external)
- If you are using an internal phone: 3333 (campus) or 9999 (external)
- Local taxi company: Streamline, 01904 656565
- Local sexual assault helpline: Survive, 01904 642830



## Ron Cooke Hub Ground floor (RCH/0xx)





## Ron Cooke Hub First floor (RCH/1xx)





## Ron Cooke Hub Second floor (RCH/2xx)

