

Peter Richard Lewis

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Current Position **University of Birmingham, UK**

Research Fellow

September 2010–Present

I am a post-doctoral Research Fellow at CERCIA (Centre of Excellence for Research in Computational Intelligence and Applications in the School of Computer Science). Having co-authored a significant part of a successful FP7 grant proposal, *Engineering Proprioception in Computing Systems (EPiCS)*, since the project began I have been employed as a Research Fellow, conducting fundamental and applied research and providing leadership in Work Package 2: *Concepts and Foundations for Self-Aware Computing Systems*.

Responsibilities and activities include:

- Collaborating with project partners to develop clear problem statements and research plans to contribute to the project's objectives.
- Conducting fundamental and applied research into algorithms, architectures and evaluation frameworks for self-aware computing systems.
- Collaborating with project partners to transfer the concepts developed to application scenarios.
- Disseminating research results and directions through scientific publications, talks, websites and software.
- Preparing research reports for the European Commission.
- Organising an international workshop on *Self-Awareness in Computing*, which I hosted and chaired at the University of Birmingham. The workshop attracted speakers from around Europe and was fully booked.
- Undertaking teaching duties including preparing and delivering lectures and assessments, and being Deputy Programme Director for two M.Sc. programmes.
- Collaborating with and providing guidance to Ph.D. students working in the area of the EPiCS project, and supervising M.Sc. students.

Research Interests Nature-inspired computation, particularly evolutionary computation, economics-inspired computation, multi-agent systems, game theory. Agent-based modelling of social and economic systems, computational economics, self-adaptive and self-organising systems. Self-aware and autonomic computing, cloud and utility computing, distributed and decentralised systems, computational resource allocation, collective intelligence.

Research Vision I am interested in modelling and understanding biological, social and economic systems, particularly with respect to their robustness, scalability and self-organisation. This understanding provides the basis for the development of novel algorithms and techniques for the development of future massively distributed and decentralised computing systems, which collectively self-organise, self-adapt and self-manage.

Education **University of Birmingham, UK**

Ph.D. Computer Science

Graduated December 2010

- Title: *Evolutionary Market-Based Resource Allocation in Decentralised Computational Systems*.
- Supervised by Professor Xin Yao, University of Birmingham and Dr. Paul Marrow, BT PLC.
- Awarded UK Research Council funding (EPSRC CASE studentship) with BT PLC.
- Awarded Ph.D. outright with no thesis modifications required, first case of this in the school for over a decade.
- Examined by Professor Jon Rowe (Birmingham) and Professor Peter McBurney (King's College London).

University of Birmingham, UK

M.Sc. Natural Computation

Graduated December 2006

- Studied neural networks, evolutionary computation, ant colony optimisation, quantum computation, molecular computation and other nature-inspired optimisation and machine learning techniques.
- Awarded full EPSRC studentship.
- Strong research component.
- Graduated with distinction and awarded *Best Student Prize*.

University of Leicester, UK

B.Sc. Computer Science

Graduated June 2001

Publications

- [1] Peter R. Lewis, Arjun Chandra, Shaun Parsons, Edward Robinson, Kyrre Glette, Rami Bahsoon, Jim Torresen, and Xin Yao. A survey of self-awareness and its application in computing systems. In *Proc. Fifth IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO)*, 2011. In press
- [2] Lukas Esterle, Peter R. Lewis, Marcin Bogdanski, Bernhard Rinner, and Xin Yao. A socio-economic approach to online vision graph generation and handover in distributed smart camera networks. In *Proc. Fifth ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC)*, 2011. In press
- [3] Peter R. Lewis, Paul Marrow, and Xin Yao. A diversity dilemma in evolutionary markets. In *Proc. Thirteenth International Conference on Electronic Commerce (ICEC)*, 2011. In press
- [4] Marcin Bogdanski, Peter R. Lewis, Tobias Becker, and Xin Yao. Improving scheduling techniques in heterogeneous systems with dynamic, on-line optimisations. In *Proc. Fifth International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS)*, 2011. In press
- [5] Shaun Parsons, Rami Bahsoon, Peter R. Lewis, and Xin Yao. Towards a better understanding of self-awareness and self-expression within software systems. Technical Report CSR-11-03, University of Birmingham, School of Computer Science, April 2011
- [6] Peter Richard Lewis. *Evolutionary Market-Based Resource Allocation in Decentralised Computational Systems*. PhD thesis, University of Birmingham, 2010
- [7] Peter R. Lewis, Paul Marrow, and Xin Yao. Resource allocation in decentralised computational systems: An evolutionary market based approach. *Autonomous Agents and Multi-Agent Systems*, 21(2):143–171, 2010 **Runner up, BT Gordon Radley Award for Best Author of Innovation**
- [8] Peter R. Lewis, Paul Marrow, and Xin Yao. Evolutionary market agents and heterogeneous service providers: Achieving desired resource allocations. In *Proc. IEEE Congress on Evolutionary Computation (CEC)*, pages 904–910. IEEE Press, 2009
- [9] Peter R. Lewis, Paul Marrow, and Xin Yao. Evolutionary market agents for resource allocation in decentralised systems. In *Parallel Problem Solving From Nature - PPSN X*, volume 5199 of *Lecture Notes in Computer Science*, pages 1071–1080. Springer, 2008

Patent

Load Balancing in a Data Network. Peter R. Lewis, Paul Marrow and Xin Yao as named inventors. International patent application with publication number WO/2010/026391. Originally filed September 2008.

Invited Talks and Posters

Game Theory: From Economics to Biology to Computer Science... And Back Again. Invited talk given at the Centre for Systems Biology, University of Birmingham, UK. November 2009.

Resource Allocation in Decentralised Computational Systems: An Evolutionary Market-Based Approach. Poster presented at the Third International School on the Design of Collective Intelligence (DECOI), in Leiden, The Netherlands. February 2009. **Awarded Best Poster Prize**.

Evolutionary Market Agents for Resource Allocation in Decentralised Systems. Invited talk given at the Broadband Applications Research Centre, BT PLC. August 2008.

Awards

BT Gordon Radley Award for Best Author of Innovation (runner up) for the paper [7]. July 2010.

IEEE Computational Intelligence Society Travel Grant to attend and present the paper [8] at the IEEE Congress on Evolutionary Computation (CEC) 2009. Award of USD 500.00, based on quality of published paper. May 2009.

Best Poster Prize at the Third International School on the Design of Collective Intelligence (DECOI), in Leiden, The Netherlands. February 2009.

Best Project Prize, team award, for the group projects at the Third International School on the Design of Collective Intelligence (DECOI), in Leiden, The Netherlands. February 2009.

Best Student Prize amongst all M.Sc. students at the University of Birmingham School of Computer Science. December 2005.

Best Poster Prize at the University of Birmingham M.Sc. Poster Competition. Judged by the School's Industrial Advisory Board. August 2005.

Additional Qualifications

University of Birmingham, UK

Associate Module in Learning and Teaching in Higher Education

Awarded July 2010

- 20 M level credits towards PG Certificate in Learning and Teaching in HE.

Activities and
Responsibilities

Contributing Author, Accepted EU FP7 IP grant proposal: *Engineering Proprioception in Computing Systems (EPiCS)*. 2010.

Reviewer for a range of international journals including *Knowledge Engineering Review*, *Electronic Commerce Research and Applications*, *Simulation Modelling Practice and Theory* and the *International Journal of Space-Based and Situated Computing*. I also regularly review for various international conferences and workshops.

Associate, Higher Education Academy (HEA). 2009–Ongoing.

Student Member, IEEE & IEEE Computational Intelligence Society. 2008–2011.

Science, Technology, Engineering and Maths (STEM) Ambassador, STEMNET. 2006–Ongoing.

Judge, British Science Association Creativity in Science and Technology (BA CREST) awards. Annually, 2007–2010.

Team Member, Local Organising Team, 8th International Conference on Intelligent Data Engineering and Automated Learning (IDEAL). December 2007.

Co-Chair, University of Birmingham Graduate School Student Council. 2007–2008.

Chair, Staff / Research Student Consultative Committee, School of Computer Science, University of Birmingham. 2007–2008.

Teaching
Experience

University of Birmingham, UK

Deputy Programme Director

September 2010–Ongoing

Responsible for deputising for the Programme Director for the *M.Sc. Natural Computation* and *M.Sc. Intelligent Systems Engineering* programmes. Specific responsibilities include co-delivering the course induction session, conducting one-to-one tutorials with students, advising on module and project choices, dealing with students' queries as they arise and being a first point of contact for students.

University of Birmingham, UK

Lecturer

September 2011–January 2011

Co-lecturer on the module *Introduction to Natural Computation*, responsible for preparing and delivering ten lectures during the semester, on a variety of topics in the field of Nature-Inspired Computation. Responsible for designing both formative and summative assessments, including co-authoring, marking and being senior invigilator for the module exam.

University of Birmingham, UK

Small Group Tutor

September 2006–April 2010

Tutor for M.Sc. Computer Science Software Workshop module. Responsibilities included planning and delivering weekly tutorials to align with lecture content, preparing material, designing assessments, marking work, providing formal and informal feedback, acting as first point of contact. Content included all aspects of Java programming and object-oriented software design.

Additional
Professional
and Voluntary
Experience

University of Birmingham Guild of Students, Edgbaston, Birmingham, UK

Trustee

July 2008–Ongoing

Appointed Lay Trustee of the University of Birmingham's students' union, a registered educational charity. I am also a member of the Guild's *Remuneration and HR Committee* and *ICT Strategy Board*. This is a voluntary position which I undertake in my spare time.

North Yorkshire County Council, Northallerton, North Yorkshire, UK

National Management Trainee

September 2003–September 2004

Management trainee on UK national graduate training scheme for local government, NGDP. Undertook placements in Risk Management, Transport, Corporate Policy and Youth Offending departments. Wrote successful bid for £10,000 research project funds; managed project, reporting to senior management on progress. Took six residential courses including project management, leadership, analytical skills and government relations.

University of Leicester Students' Union, Leicester, UK

Students' Union President

July 2001–July 2003

Elected and subsequently re-elected as full-time Union President, jointly responsible for 70 staff and £5m turnover. Specific responsibilities included university, media and government relations, student participation, campaigns and democracy.