PRINCIPAL INVESTIGATORS

DR RADU CALINESCU

Radu Calinescu is a Lecturer in Computing at Aston University, and a part-time Lecturer on the Software Engineering Programme at the University of Oxford, a position that he has held since 2005. He was previously a Senior Researcher on the Formal Verification research theme at the University of Oxford, and holds an award-winning DPhil in Computation from the University of Oxford. His recent research on adaptive IT systems and systems of systems won Best Paper Awards at international academic conferences, and the generic development methods and general-purpose software tools he devised as part of this work are currently used by external researchers and practitioners involved in the development of self-managing systems. He has chaired or has been on the program committees of multiple international conferences on autonomic, adaptive and complex computer systems. He is a Senior Member of the IEEE and a member of the Editorial Advisory Board for the International Journal on Advances in Intelligent Systems.

AREAS OF RESEARCH

- Computation
- Adaptive Systems and Systems of Systems
- Senior Member of IEEE

PUBLICATIONS

- R. Calinescu, D. Cliff, J. Keen, T. Kelly, M Kwiatkowska, J. McDermid, R. Paige, & I. Sommerville (2010). "The UK Large-Scale Complex IT Systems (LSCITS) Initiative." (pdf file)
- Radu Calinescu, Lars Grunske, Marta Kwiatkowska, Raffaela Mirandola and Giordano Tamburrelli - Dynamic QoS Management and Optimisation in Service-Based Systems. To appear in IEEE Transactions on Software Engineering, 2010.
- R. Calinescu, S. Kikuchi & M. Kwiatkowska. Formal Methods for the Development and Verification of Autonomic IT Systems. In Cong-Vinh, P. (ed.), Formal and Practical Aspects of Autonomic Computing and Networking: Specification, Development and Verification, IGI Global. To appear.
- A. Hernando, R. Sanz & R. Calinescu. A Model-Based Approach to the Autonomic Management of Mobile Robot Resources. Proceedings of the Second International Conference on Adaptive and Self-adaptive Systems and Applications, 2010. To appear.
- R. Calinescu & M. Kwiatkowska. Software Engineering Techniques for the Development of Systems of Systems. In C. Choppy & O. Sokolski (editors), Foundations of Computer Software. Future Trends and Techniques for Development, vol. 6026 of LNCS, pp. 59-82, Springer, 2010.

PROFESSOR DAVE CLIFF

Dave Cliff is professor of computer science at the University of Bristol, and a chartered fellow of the BCS. He has previously held faculty posts at the universities of Sussex and Southampton in the UK, and at the MIT Artificial Intelligence Lab in the US. He spent 1998-2005 working in industry, initially as a research scientist for Hewlett-Packard Labs near Bristol, and latterly as a director for Deutsche Bank's Foreign Exchange Complex Risk Group, in the City of London. He's worked as a consultant for a number of companies, mainly in media and finance, and has also acted as a consultant and advisor to the UK Government.

AREAS OF RESEARCH

- Algorithmic Trading
- Advisor
- Inventor

PUBLICATIONS

- [Complexity and Emergent Behaviour in ICT Systems](#) (UK Government Office of Science and Technology briefing paper; Dave Cliff was one of the co-authors).
- [Marco De Luca, Dave Cliff - AGENT-HUMAN INTERACTIONS IN THE CONTINUOUS DOUBLE AUCTION, REDUX: Using the OpEx Lab-in-a-Box to explore ZIP and GDX - Proceedings of the 3rd International Conference on Agents and Artificial Intelligence, 2011.](#)
- [Marco De Luca, Dave Cliff - Evaluation of the Adaptive-Aggressive Trading-Agent Strategy Against Human Traders in CDA: AA Wins - Proceedings of the 10th International Conference on Autonomous Agents and Multiagent Systems, 2011.](#)
- [D. Cliff. ZIP60: Further Explorations in the Evolutionary Design of Trader Agents and Online Auction-Market Mechanisms. *IEEE Transactions on Evolutionary Computation*. **13**(1):3-18, 2009.](#)

PROFESSOR JUSTIN KEEN

Justin Keen is Professor of Health Politics in the Leeds Institute of Health Sciences. His main research interests are in the governance of health care, and in particular the application of systems and network concepts to the organization and delivery of care, and the role of information technologies in health care.

AREAS OF RESEARCH

- The governance of healthcare
- IT in healthcare

PUBLICATIONS

- J. Keen. Complexity and Contradiction: the case of the NHS National Programme for IT. In: C Hood and H Margetts (eds) *Paradoxes of Modernization.* Oxford University Press (2009)

PROFESSOR MARTA KWIATKOWSKA

Marta Kwiatkowska is Professor of Computing Systems and Fellow of Trinity College, University of Oxford. Prior to this she held appointments at the Universities of Birmingham, Leicester and the Jagiellonian University in Cracow, Poland.

Marta Kwiatkowska spearheaded the development of probabilistic and quantitative methods in verification on the international scene. The PRISM model checker (www.prismmodelchecker.org) developed under her leadership is the leading software tool in the area, cited 2000 times, and is widely used for research and teaching. Applications of probabilistic model checking have spanned communication and security protocols, dependability analysis, nanotechnology designs, power management and systems biology. Kwiatkowska has been invited to speak at a number of leading conferences and summer schools, including LICS 2003, ESEC/FSE 2007 and FASE/ETAPS 2011 conferences, and ESSLLI 2010 and Marktoberdorf 2011 summer schools. Her research is currently

supported by £3.7m of grant funding from EPSRC, EU and ERC, including the recently awarded ERC Advanced Grant VERIWARE "From software verification to everyware verification".

Marta Kwiatkowska is a Fellow of the BCS. She is on editorial boards of several journals, including IEEE Transactions on Software Engineering, Science of Computer Programming and Royal Society's Philosophical Transactions A. She regularly serves as a member of numerous programme committees and is a founding member of the Steering Committee of the International Conference on Quantitative Evaluation of SysTems (QEST). She was lead organiser of the Royal Society Discussion Meeting "From computers to ubiquitous computing, by 2020" and guest co-editor of the associated Proceedings in Phil. Trans. R. Soc. A vol 366 no 1881.

AREAS OF RESEARCH

- Probabilistic and quantitative methods in verification
- From software verification to everyware verification

PUBLICATIONS

- Radu Calinescu, Lars Grunske, Marta Kwiatkowska, Raffaela Mirandola and Giordano Tamburrelli - Dynamic QoS Management and Optimisation in Service-Based Systems. To appear in IEEE Transactions on Software Engineering, 2010.

PROFESSOR JOHN MCDERMID

John McDermid is Professor of Software Engineering at the University of York where he heads a major research group studying high integrity systems. He has worked extensively with industry, particularly in the aerospace sector. He is best known for his work on safety, including the Goal Structuring Notation (GSN) which is now the d*e facto* standard for presenting safety arguments. He has given courses on safety and software engineering to more than 120 companies on five continents. He has published 6 books and over 320 papers. He was elected a Fellow of the Royal Academy of Engineering in 2002. He has extensive experience as a consultant, mainly in the area of safety critical systems and software. He advised the MoD on the development of DS 00-56 Issue 4. He is also a member of the Defence Scientific Advisory Council providing advice to the MoD on their research programmes and on a variety of projects. OBE in 2010 New Year's Honours List.

AREAS OF RESEARCH

- Safety

- Safety and Software Engineering

PUBLICATIONS

- [X. Ge, R.F. Paige and J.A. McDermid. An Iterative Approach for Development of Safety-Critical Software and Safety Arguments, in Proc. Agile 2010, IEEE Press, Nashville, Tennessee, August 2010.](#)

- [X. Ge, R.F. Paige and J.A. McDermid. Analysing System Failure Behaviours with PRISM, in Proc. Workshop on Model-Checking Secure and Reliable Systems (co-located with SSIRI 2010), IEEE Press, Singapore, June 2010.](#)

PROFESSOR RICHARD PAIGE

Prof. Richard Paige holds a chair in Enterprise Systems at the University of York. He previously held an academic post at York University in Canada. His research focuses on software engineering for large-scale systems, particularly investigating the challenges of abstraction and automation when applied to enterprise-wide systems that have substantial reliability, robustness, safety and security requirements. His recent work has concentrated on the design, development and implementation of domain-specific languages and tools for supporting abstraction while enabling automation in the engineering process. He sits on the steering committees of several conferences in the field of model-driven engineering (TOOLS, ICMT, ECMFA) and is on the editorial boards of the Journal of System Architecture and Software & System Modelling.

AREAS OF RESEARCH

- Design, development and implementation of domain-specific languages and tools for supporting abstraction while enabling automation in the engineering process

PUBLICATIONS

- [Louis M. Rose, Dimitrios S. Kolovos, Nikolaos Drivalos, James R. Williams, Richard F. Paige, Fiona A. C. Polack, Kiran Jude Fernandes: Concordance: A Framework for Managing Model Integrity. ECMFA 2010: 245-260](#)
- [J.R. Williams, F.A.C. Polack & R.F. Paige. Formal analysis in model management: exploiting the power of CZT, To appear in *Proc. ASM, Alloy, B and Z (ABZ) 2010*, Orford, Quebec, Canada, February 2010, LNCS, Springer-Verlag.](#)

PROFESSOR IAN SOMMERVILLE

Ian Sommerville has been a professor of computer science at St Andrews since 2006 and was previously at Lancaster University. His research interests are primarily in complex systems engineering with a focus on dependability, requirements engineering and socio-technical systems. While at Lancaster, he cooperated with sociologists to study complex computer-based systems with a view to understanding the realities of their use and this has led to a long-term interdisciplinary collaboration. He is convinced that by examining social, organisational and human issues that we can build systems that offer faster 'time to value' after they have been deployed. His goal now is to make socio-technical systems engineering a reality where we use our understanding of socio-technical issues in the development process to create more usable and dependable software systems.

AREAS OF RESEARCH

- Complex systems engineering with a focus on dependability, requirements engineering and socio-technical systems

PUBLICATIONS

- D. Greenwood, A. Khajeh-Hosseini, & I. Sommerville. Towards a Multi-level Model of Conflict to Sensitise practitioners to the Socio-organisational Complexity of an IT Systems Development Project. Submitted to Journal of Information Technology. 2010
- A. Khajeh-Hosseini, D. Greenwood & I. Sommerville. Cloud Migration: A Case Study of Migrating an Enterprise IT System to IaaS. In Proc. The 3rd International Conference on Cloud Computing. 2010.

PROJECT ADMINISTRATORS

CLARE WILLIAMS

Clare Williams is the Project Adminstrator for LSCITS and is based at the University of Bristol. She is responsible for arranging all the regular team events, conferences and meetings for the project as well as the development and maintenance of the LSCITS website, monitoring the finance of the project and Dave Cliff's diary.

She has extensive experience in administration both in the private and public sector. She worked as PA for lawyers and accountants as well as spending four years working for doctors and surgeons in the NHS. She has over 7 years' experience in Higher Education at the University of Bristol.

Clare began studying web design in 2002.

AREAS OF EXPERTISE

- Web Design & Development
- Conference Organisation
- Administration in Higher Education

INTERESTS

- Web Design & Development
- Travel

DAWN FORD

Dawn Ford is based at the University of York and is responsible for the EngD administration.

- [Dr Raphaël Clifford](#)
- [Dr Kerstin Eder](#)
- [Dr Ayalvadi Ganesh](#)
- [Dr Tim Kelly](#)
- [Dr James Marshall](#)

- [Dr Manuel Oriol](#)
- [Dr Fiona Polack](#)
- [Dr Chris Preist](#)
- [Professor Colin Runciman](#)
- [Dr Tom Scutt](#)
- [Dr Karoline Wiesner](#)

ASSOCIATE FACULTY

DR RAPHAËL CLIFFORD

Raphaël Clifford is a Senior Lecturer at the University of Bristol. ....Further information to follow shortly.

AREAS OF RESEARCH

- Algorithms
- Computational Complexity

PUBLICATIONS

DR KERSTIN EDER

Kerstin is a Senior Lecturer in Computer Science at the University of Bristol and normally teaches the Master-level Design Verification unit and the concurrency part of the Concurrency and Communications unit.

In collaboration with a consortium of local microelectronic design companies she has initiated the introduction of the new MSc in Advanced Microelectronic Systems Engineering in 2006 and is now the Director of this MSc programme which is run jointly between the Department of Computer Science and the Department of Electrical and Electronic Engineering. In addition, she is the Programme Director of the undergraduate MEng in Computer Science and Electronics.

In 2007 Bristol has been selected as a lead university to head the Cadence Academic Network in the area of Advanced Verification. She was invited to present her state-of-the-art approach to Design Verification education and research at CDNLive! in April 2008. More information can be obtained from a press release that recently appeared at Electronicstalk.

AREAS OF RESEARCH

- Specification, verification and analysis techniques which allow designers to define a design and to verify/explore its behaviour in terms of functional correctness, performance, power consumption and energy efficiency
- Computational logic, especially formal verification, declarative programming languages and their implementation, abstract machines, compilation techniques and meta programming

PUBLICATIONS

See Website

DR AYALVADI GANESH

I am interested in the mathematical modelling of communication and computer networks, and in decentralised algorithms for such networks. Specific interests include large deviations and applications to queueing theory and statistics, random graph models and stochastic processes on graphs, and decentralised algorithms for resource allocation in the Internet and in wireless networks.

AREAS OF RESEARCH

- [Complex Systems](#)
- [Applied Probability](#)
- [Bayesian Modelling & Analysis](#)
- [Optimisation under Uncertainty](#)

PUBLICATIONS

- [All listed here](#)

DR TIM KELLY

Dr Kelly is a Senior Lecturer within the Department of Computer Science at the University of York. He is also Academic Theme Leader for Dependability within the UK MoD-funded Software Systems Engineering Initiative. His research interests include safety case management, software safety analysis and justification, software architecture safety, certification of adaptive and learning systems, and the dependability of "Systems of Systems". He has supervised a number of research projects in these areas with funding and support from Airbus, BAE SYSTEMS, Data Systems and Solutions, DTI/TSB, EPSRC, ERA Technology, Ministry of Defence, QinetiQ and Rolls-Royce. He has published over 150 papers on high integrity systems development and justification in international journals and conferences.

AREAS OF RESEARCH

- Safety case management, software safety analysis and justification, software architecture safety, certification of

PUBLICATIONS

- [Z. Kurd, T. Kelly, J. McDermid, R. Calinescu & M. Kwiatkowska. Establishing a Framework for Dynamic Risk Management in 'Intelligent' Aero-Engine Control. In *Proceedings of 28th International Conference on Computer Safety, Reliability, and Security (Safecomp2009)* LNCS, Springer, 2009.](#)

- [Z. Kurd, T. Kelly, J. McDermid, R. Calinescu & M. Kwiatkowska. Toward a Self-Management Architecture for Dynamic Risk Management in 'Intelligent' Aero-Engine Control. *IET System Safety,* London, 2009.](#)

DR JAMES MARSHALL

James Marshall is a Reader in Computational Systems Biology at the University of Sheffield. He has been invited to contribute to a AAAI symposium on modeling complex adaptive systems as if they were voting processes, at Stanford University, on March 21st-23rd 2011. James has also been invited to participate in a meeting on '[Insect Self-Organisation and Swarming](#)' at the NSF Mathematical Biosciences Institute, Ohio State University, on March 14th-18th 2011 and was invited to participate in the [Ernst Strüngmann Forum](#) on 'Cognitive Search: Evolution, Algorithms and the Brain', which was held at the [Frankfurt Institute for Advanced Studies](#) in February 2011.

For further information see his personal [web page](#).

AREAS OF RESEARCH

- Biologically-Inspired Algorithms,
- Cognitive Behaviour,
- Complex Adaptive Systems,
- Decision Theory,
- Evolutionary Theory,
- Mathematical Biology,
- Social Insect Behaviour

DR MANUEL ORIOL

Manuel Oriol has an MSc from ENSEEIHT (Toulouse) and a PhD from University of Geneva. He has work experience at University of Maryland, at ETH Zurich and is currently a senior lecturer at University of York. He has worked on various topics that include middleware, computer science education, dynamic software updating, and software testing.

AREAS OF RESEARCH

- Middleware, computer science education, dynamic software updating, and software testing

PUBLICATIONS

- [M. Oriol, F. Ullah. YETI on the cloud. In Testing In The Cloud (STITC) workshop at ICST 2010.](#)

DR FIONA POLACK

Dr Polack is a Senior Lecturer in the Department of Computer Science at the University of York. She is a CI on the EPSRC CoSMoS project on complex systems simulation, and has a particular interest in modelling and validation of agent-based complex systems simulations for use in science and engineering. With Prof. Richard Paige, she is supervising a range of PhD projects related to model-driven engineering.

AREAS OF RESEARCH

- Model driven engineering

PUBLICATIONS

- Louis M. Rose, Dimitrios S. Kolovos, Nikolaos Drivalos, James R. Williams, Richard F. Paige, Fiona A. C. Polack, Kiran Jude Fernandes: Concordance: A Framework for Managing Model Integrity. ECMFA 2010: 245-260

CHRIS PREIST

Chris Preist is a Reader in Computer Science at the University of Bristol. He is also an Associate of Forum for the Future http://www.forumforthefuture.org.uk, faculty member of the WWF *One Planet Leaders programme* http://www.panda.org/what_we_do/how_we_work/businesses/training/ and a freelance consultant in innovation and sustainability.

Prior to joining Bristol, he was Head of Sustainable IT Research at HP Labs, Bristol from 2007-09, where he led work on the strategic impact of climate change on business and technology development to exploit emerging opportunities. Prior to this, his research was primarily in the areas of artificial intelligence, knowledge representation, agent technology, and the semantic web. He was the technical lead on the EU Framework 5 Semantic Web-based Web Services project, coordinating input from over 20 researchers across 8 insitutions, and chair of the Scientific Advisory Board of the Framework 6 DIP project. His work in the application of artificial intelligence techniques to automated diagnosis led to the deployment of several systems within HP manufacturing facilities and the development of an award winning product (Agilent Fault Detective). He has a degree in Mathematics from Warwick University, and a Ph.D. in Semantics of Logic Programming from Imperial College, London. He has had over 40 publications in refereed conferences and journals, and 6 patents granted.
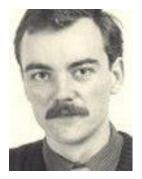
AREAS OF RESEARCH

- The integration of life cycle analysis and carbon footprinting techniques into broader systemic models of sustainability impact.
- The role of computer technology within the wider socio-technical systems emerging to address climate change and other sustainability issues.
- The interplay between technology innovation, business models and sustainability impacts, particularly in the commercial publishing industry

PUBLICATIONS

- Reducing the Greenhouse Gas Emissions of Commercial Print with Digital Technologies. Canonico, S., Sellman, R. and Preist, C.

- [Proceedings of the IEEE International Symposium on Sustainable Systems and Technology, 2009](). [Integral Ecology applied to Small Scale Community Woodlands](). Preist, C. Journal of Corporate Citizenship,30, pp67-79, June 2008.

DR COLIN RUNCIMAN

Colin Runciman read Mathematics and Computation in his first degree, and his PhD was in theoretical Computer Science. He worked as a researcher in laboratory automation and compiler construction before taking up a permanent academic post. He has three decades of research and teaching experience in Computer Science, mostly in software technology and related theory. He has held visiting research positions in both academic and industrial organisations in Europe and North America. He is currently Professor of Computer Science at York, where he leads a research group in Programming Languages and Systems.

AREAS OF RESEARCH

- Programming Languages and Systems

DR TOM SCUTT

Tom Scutt is currently a part-time lecturer in computer science at the University of Bristol. He was a full-time lecturer in AI at the University of Nottingham for seven years, before joining the video game industry in 1998. Since then he has worked in the games industry as programmer (including the AI programming for several of the *Tomb Raide*r games), designer, and studio manager; while still regularly giving academic lectures. He currently acts as a Game Design consultant for a number of companies. His research interests include MMO game AI & virtual economics; pervasive/locative games; using games to teach programming at primary level; and 'gamification' (using social/casual gaming reward systems to modify real-world behaviour).

AREAS OF RESEARCH

- MMO game AI & virtual economics
- Using games to teach programming at primary level;

DR KAROLINE WIESNER

Karoline Wiesner is Lecturer in the School of Mathematics at the University of Bristol. She is the Director of Studies at the Bristol Centre for Complexity Sciences. She holds a PhD in Physics. She has held postdoctoral positions at the Santa Fe Institute for Complex Systems and the University of California, Davis, U.S. Her work is on information theory and complex biological systems. [Read more ...](#)

AREAS OF RESEARCH

- Complex Systems
- Quantum Information

PUBLICATIONS

Intrinsic quantum computation (2008)
J. P. Crutchfield, K. Wiesner
Phys. Lett. A vol: 372 , Issue: 4 , Pages: 375 - 380
DOI: http://dx.doi.org/10.1016/j.physleta.2007.07.052
URL provided by the author

Computation in Finitary Stochastic and Quantum Processes (2008)
K. Wiesner, J. P. Crutchfield
Physica D
DOI: http://dx.doi.org/10.1016/j.physd.2008.01.021
URL provided by the author

RESEARCHERS

- [Mr Leon Atkins](#)
- [Dr Adam Barker](#)
- [Dr Gordon Baxter](#)

- [Mr Michael Meadows](#)
- [Mr Chris Musselle](#)
- [Ms Yasmin Rafiq](#)

- [Dr John Cartlidge](#)
- [Mr Tom Cassey](#)
- [George Despotou](#)
- [Ms Lu Feng](#)
- [Dr Xiaocheng Ge](#)
- [Mr David Greenwood](#)
- [Mr Mo Haghighi](#)
- [Dr Kenneth Johnson](#)
- [Mr Ali Khajeh-Hosseini](#)
- [Mr Marco de Luca](#)

- [Mr Jason Reich](#)
- [Mr Owen Rogers](#)
- [Dr John Rooksby](#)
- [Mr James Smith](#)
- [Mr Ilango Sriram](#)
- [Ms Charlotte Szostek](#)
- [Mr Duncan Tait](#)
- [Dr Derek Wang](#)
- [Mr James Williams](#)

MR LEON ATKINS

Leon is a PhD student at the University of Bristol in the [Algorithms group](#) under the supervision of [Raphaël Clifford](#). He is currently researching the power consumption of algorithms. More specifically, he is investigating online scheduling with speed scaling in novel and restricted settings and also hopes to look at the issue of temperature management from an algorithmic point of view.

Departmental Involvement

- Organiser of the [Theory of Computing Reading Group](#)
- He has also been a Student Assistant for the departmental [Admissions](#) Days and [Open Days](#).
- He is the ex-Vice President of the Computer Science Society (CSS)

Other

- Leon is a member of the [Theory of Computing](#) reading group

AREAS OF RESEARCH

- Power consumption of algorithms
- Online scheduling with speed scaling in novel and restricted settings

DR ADAM BARKER

Adam Barker is a Lecturer in the School of Computer Science, University of St Andrews. Prior to moving to St Andrews, Adam worked as a postdoctoral researcher at the University of Melbourne, the University of Oxford and the National e-Science Centre (NeSC), University of Edinburgh. He completed his PhD at the School of Informatics, University of Edinburgh.

Adam's broad research interests concentrate on the theoretical foundations and effective engineering of large-scale distributed systems, his current interests are in Cloud computing infrastructures. He is Co-Investigator of the Elastic Virtual Infrastructure for Research Applications (ELVIRA) project, funded via EPSRC and JISC.

AREAS OF RESEARCH

- Cloud Computing Infrastructures
- Co-Investigator of the Elastic Virtual Infrastructure for Research Applications (ELVIRA) project

DR GORDON BAXTER

Gordon Baxter, University of St Andrews, has degrees in Computer Science (BSc(Eng)), Cognitive Science (MPhil), and Human Factors (PhD). He has several years experience in systems development, mostly on industrial and defence applications, having worked for Rolls Royce, Racal, Systems Designers, NEI and ICI. Most of this work involved aspects related to user interface design and human-computer interaction. Since joining academia he has worked on projects looking at rapid decision making in complex environments (for the DRA), dependability of computer based systems (for the NHS in Leeds, and several social services departments across the UK), and large scale complex IT systems. He is a Chartered Engineer, a Member of the British Computer Society, and an Associate Member of the Ergonomics Society.

AREAS OF RESEARCH

- Rapid decision making in complex environments
- Dependability of computer based systems
- Large scale complex IT systems

PUBLICATIONS

- [F. E. Ritter, G. Baxter, J. W. Kim, S. Srinivasmurthy "Learning and Retention" to appear in The Oxford Handbook of Cognitive Engineering, Vol. 1: Foundations, Perspectives and Cognitive Issues, edited by J.D. Lee and A. Kirlik.](#)
- [G. Baxter & I. Sommerville. Socio-Technical Systems: From design methods to systems engineering. To appear in Interacting With Computers. 2010.](#)

DR JOHN CARTLIDGE

In October 2010, John Cartlidge became a Research Associate in Cloud Computing at the University of Bristol, working on the development of a rigorous simulation framework for modelling next-generation large-scale data centres for delivery and pricing of cloud services. He has a first class BSc in Artificial Intelligence & Mathematics (2000) and a PhD in Computer Science (2004), both from the University of Leeds, UK. After receiving his PhD he spent four years in industry working for Hewlett-Packard Labs European Research Centre, the London Stock Exchange (LSE), and other smaller companies on commercial research projects including: agent-based modelling of the LSE; statistical modelling of bidder behaviour on eBay; and development of a proprietary dark liquidity exchange (patent pending). From 2008-10, John worked as a Research Associate at the University of Central Lancashire, UK, where his research focused on evolutionary computation and finance. He is director and co-founder of Victria.net, a private consultancy company specializing in financial software design and development.

AREAS OF RESEARCH

- Development of a rigorous simulation framework for modelling next-generation large-scale data centres for delivery and pricing of cloud services

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MR TOM CASSEY

Tom Cassey is a PhD student at the University of Bristol. Tom recently graduated from Bristol with a masters degree in Computer Systems Engineering. In October 2008 Tom commenced a PhD, jointly sponsored by HP Labs and the University of Bristol, looking into developing statistically optimal, or near-optimal methods for performing decentralised control in distributed systems.

AREAS OF RESEARCH

- Developing statistically optimal, or near-optimal methods for performing decentralised control in distributed systems

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GEORGE DESPOTOU

George is a researcher in the high integrity systems engineering (HISE) group. George has previously worked for the Software Systems Engineering Initiative (SSE), the Dependable Computing Systems Centre (DCSC) funded by BAE Systems and the Defence and Aerospace Research Partnership (DARP), in collaboration with BAE Systems, Qinetiq and Rolls-Royce.

He holds a PhD on dependability cases and co-evolution with complex critical systems, which defined the Dependability Case Metamodel (DCM). Current research activities and interests include requirements engineering and assurance of critical systems, safety analysis using model driven approaches (such as defence architectural frameworks DODAF & MODAF and enterprise modelling frameworks), and assurance of Systems of Systems.

AREAS OF RESEARCH

- Requirements engineering and assurance of critical systems, safety analysis using model driven approaches

MS LU FENG

Lu Feng is a research student at Oxford University Computing Laboratory, and a member of Trinity College, Oxford. She holds a B.Eng in Information Engineering from the Beijing University of Posts and Telecommunication (China) and a M.Phil in Computer Speech, Text and Internet Technology from the University of Cambridge. She is currently pursuing a D.Phil in Computer Science as part of the Predictable Software Systems component of the EPSRC-funded Large-Scale Complex IT Systems initiative. Her supervisor is Professor Marta Kwiatkowska.

AREAS OF RESEARCH

- Predictable Software Systems component of the EPSRC-funded Large-Scale Complex IT Systems

DR XIAOCHENG GE

Xiaocheng Ge has degrees from Beijing University, China, in Aeronautics and Astronautics. He has been working and studying at University of York since 2004. He is interested in the field of high integrity system engineering, particular the topics of agile and model-driven software development, security and safety of complex systems.

AREAS OF RESEARCH

- Agile and model-driven software development, security and safety of complex systems

MR DAVID GREENWOOD

David Greenwood is a PhD student at the University of St Andrews funded by an EPSRC studentship. David has a Master's degree in Applied Informatics from the University of Reading and holds an MA and BA in Natural Sciences from the University of Cambridge. He is a member of the UK Association for Information Systems and a member of the ACM. David's previous research has been in the interoperability and alignment of IT systems and business processes. Today his research focuses on a related area, the affect of social and organisational complexity on IT project performance.

AREAS OF RESEARCH

- The affect of social and organisational complexity on IT project performance

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MR MO HAGHIGHI

Mo Haghighi is a full time PhD student at the University of Bristol. He is currently pursuing his research in the area of "Decentralized Adaptive Dynamic Data Gathering in Wireless Sensor Network" in collaboration with the BAE Systems. He has obtained his BEng in Electronic and Telecommunications engineering followed by an MSc in Wireless Sensor Networks. He specialises in embedded system design, sensor networks and microwave communications. Having worked for Sun Microsystems for two years, he has extensive programming experience in Java, C/C++, SystemC and Assembly. He has been developing an operating system for 8-32 bit embedded systems called "ACRAYBOT" which is multi-threading, multi-tasking, light and very flexible. He has also designed and implemented several projects including: "Automated RFID register system", "Smart sensor network for energy management" and "autonomous sensor-based robotic platform". His current research focuses on designing Middleware for WSNs in order to enable optimal adaptability with different hardware platforms and application services.

AREAS OF RESEARCH

- Decentralized Adaptive Dynamic Data Gathering in Wireless Sensor Network

MR KENNETH JOHNSON

Kenneth is currently a post-doc researcher at Aston University working with Radu Calinescu on the EPSRC-funded project "Cloud Computing for Large-Scale Complex IT Systems".

The work in this area aims to provide a theoretical foundation to specify, analyse and verify non-functional properties of cloud-based systems applied to several case studies in industry.

Before joining the LSCITS project, he worked at L'Institut National de Recherche en Informatique et en Automatique in Rennes, France in embedded system specification. The research developed semi-automatic methods of translating thread-based programs into the synchronous language SIGNAL which were used to analyse static and dynamic properties of program control-flow in order to detect deadlocks.

His research background is in the algebraic theory of data types. A data type consists of data and operations on data modeled by sets and functions respectively, to form algebras. It is a rich and general theory allowing the specification of data types, reasoning with them mathematically, and analysing programs that compute with them.

His work in this area developed a unifying theory of spatial objects modelled by discrete and continuous data types, particularly in the case of the continuous functions over the real numbers, with applications to case studies in volume graphics. In the theory of data types it is natural to consider computability, which is the topic of ongoing work in this subject.

AREAS OF RESEARCH

- Algebraic theory of data types

MR ALI KHAJEH-HOSSEINI

Ali Khajeh-Hosseini is a PhD student at the St Andrews Cloud Computing Co-Laboratory, University of St Andrews. He has an MSc in High Performance Computing from the Edinburgh Parallel Computing Centre at the University of Edinburgh, and a BSc in Computer Science from the Robert Gordon University in Aberdeen. His research focuses on socio-technical issues in cloud computing, and aims to help enterprises make decisions regarding the adoption of cloud computing by analysing its costs, benefits and risks.

AREAS OF RESEARCH

- Socio-technical issues in cloud computing

PUBLICATIONS

- A. Khajeh-Hosseini, D. Greenwood & I. Sommerville. Cloud Migration: A Case Study of Migrating an Enterprise IT System to IaaS. In Proc. The 3rd International Conference on Cloud Computing. 2010.

MR MARCO DE LUCA

Marco De Luca holds a M.Sc. in Computer Science at University of Pisa, Italy. Marco has extensive working experience developing leading-edge algorithmic trading systems for major multinational companies in the global financial markets. He was Assistant Vice President in the department of Derivatives IT at Credit Suisse, London; Manager in the Algorithmic Trading team at Barclays Capital, London; Senior Software Developer in the MarketView team at ABN Amro, London. He also worked for ION Trading, major producer of electronic trading middleware services such as the MarketView software suite.

Marco is currently a self-funding doctoral student in Computer Science at the University of Bristol, where he is a member of Dave Cliff's LSCITS Research Group. Marco is pursuing his PhD research on adaptive algorithmic trading agents, of relevance to real-world financial markets and also to decentralized market-based control of ultra-large-scale complex IT systems. Marco commenced his studies, and joined the Bristol LSCITS Group, in October 2009.

AREAS OF RESEARCH

- Adaptive algorithmic trading agents, of relevance to real-world financial markets and
- Decentralized market-based control of ultra-large-scale complex IT systems

PUBLICATIONS

- [Marco De Luca, Dave Cliff - AGENT-HUMAN INTERACTIONS IN THE CONTINUOUS DOUBLE AUCTION, REDUX: Using the OpEx Lab-in-a-Box to explore ZIP and GDX - Proceedings of the 3rd International Conference on Agents and Artificial Intelligence, 2011.](#)

- [Marco De Luca, Dave Cliff - Evaluation of the Adaptive-Aggressive Trading-Agent Strategy Against Human Traders in CDA: AA Wins - Proceedings of the 10th International Conference on Autonomous Agents and Multiagent Systems, 2011.](#)

MR PAUL MAYO

Paul Mayo spent 21 years as an engineer in the Royal Air Force. He successfully completed the Safety Critical Systems Engineering MSC at the University of York during 2001-2002 and spent the following 3 years assuring the safety of aircraft and weapons systems on secondment to QinetiQ at Boscombe Down. Paul retired from the Royal Air Force in 2005 and has remained in the safety critical field, working as a safety engineer, safety manager and safety consultant on rail signalling systems, UAVs, weapon systems and helicopters. His research is focusing on operational safety cases for large scale complex IT systems.

AREAS OF RESEARCH

- Operational safety cases for large scale complex IT systems

PUBLICATIONS

- P. Mayo. Creating a Competence Argument to Support a Safety Case. *IET System Safety*, London, 2009
- P. Mayo. Structured Safety Case Evluation: A Systematic Approach to Safety Case Review. *IET System Safety*, London, 2006

- T. Kelly, R. Weaver, P. Mayo. Gaining Confidence in Goal Based Safety Cases. *Safety Critical Systems Symposium*, Bristol, 2006
- P. Mayo. Practical Integration of Safety Assessment into Aircraft Test and Evaluation. *Military Aerospace Test and Evaluation Conference*, London, 2004

MR MICHAEL MEADOWS

Michael is a PhD Student at the University of Bristol. He achieved his BSc in Computer Science at the University of Leicester and then moved to Bristol to pursue research more closely linked to his own interests. After starting on a joint venture research programme with the University of Bristol and BAE Systems, Michael joined the LSCITS group and is currently supervised by Professor Dave Cliff. He is currently researching opinion dynamics across large populations from the broader subject of examining large-scale attacks on socio-technical systems. Although his primary focus was originally to research population dynamics in populations that contain a subversive and malicious threat, his interests have broadened since joining LSCITS allowing him to consider the complexity of opinion dynamics as a broader subject.

AREAS OF RESEARCH

- Opinion dynamics

MR CHRIS MUSSELLE

Chris Musselle is a PhD student at the University of Bristol, undertaking a 4 year program at the Bristol Centre for Complexity Sciences (BCCS) doctoral training centre. He holds a Master's degree in Chemistry from the University of Bristol, and is currently pursuing research into the detection of malicious software across large scale networks. His primary research interests include; Machine learning and anomaly detection, modelling and simulation, and graphical models.

AREAS OF RESEARCH

- Machine learning and anomaly detection
- Modelling and simulation
- Graphical models

MS YASMIN RAFIQ

Yasmin Rafiq carries out research at the University of Aston in the area of online machine learning for self-star, cloud-based systems. Initially my research work will target service-based systems deployed in the cloud, as their component services are often characterised by variable non-functional parameters such as service rates and failure rates. The machine learning algorithms and techniques developed as part of this research will ensure that the operational models that guide self-adaptation in cloud-based systems are brought and maintained in sync with the actual behavior of these systems, based on observations of this behavior. These techniques will enable self-star, cloud-based systems to attain improved adaptiveness when the initial models they base their decisions upon are approximate, and when the system behavior changes over time.

AREAS OF RESEARCH

- Service-based systems deployed in the cloud

MR JASON REICH

Jason Reich is a research student at the University of York, having previously completed an MEng in Computer and Systems Software Engineering. His PhD, co-supervised by Professors Colin Runciman and Richard Paige, is investigating the formal verification of functional language implementations. His academic interests generally lie within the topics of functional languages (in particular, Haskell), semantics, compiler design, formal methods and innovative architectures.

AREAS OF RESEARCH

- Haskell

MR OWEN ROGERS

Owen Rogers is a PhD student at the University of Bristol. Owen graduated from Cardiff University with a MEng in Computer Systems Engineering in 2005. Following this, he joined telecommunications firm Cable & Wireless, first as a Graduate Engineer, and then as Product Development Manager for Managed Security Services. In 2009, Owen joined managed services provider Claranet, as Product Portfolio Manager. He started his PhD, sponsored by HP Labs, in March 2010 and is looking into ways of understanding and modelling increasing complexity and scale in cloud computing infrastructures. Owen is a Certified Cisco Network Associate and a Member of the British Computer Society.

AREAS OF RESEARCH

- Understanding and modelling increasing complexity and scale in cloud computing infrastructures.

DR JOHN ROOKSBY

John Rooksby is a research fellow at the University of St Andrews. He holds a BSc (first class) and PhD in Computer Science, both awarded by the University of Manchester. He took his position at St Andrews in 2008. He has previously held research positions at Lancaster University and The University of Salford. His research is in the area of socio-technical systems; he has carried out a number of studies of the uptake and use of systems in healthcare and human practices in software development and testing.

AREAS OF RESEARCH

- Socio-technical systems

MR JAMES SMITH

James Smith is a doctoral research student at the University of St Andrews in Scotland. He graduated with a B.Sc in Computer Science from St Andrews in 2009 then returned to pursue a Ph.D with an LSCITS initiative funded studentship. His supervisor is Prof. Ian Sommerville.

Since starting his research course in September 2009 he has begun to look at Socio-Technical Issues in Cloud Computing. In particular he is interested in the potential energy efficiency impacts of Cloud systems and how they effect organisations.

AREAS OF RESEARCH

- Socio-Technical Issues in Cloud Computing

MR ILANGO SRIRAM

Ilango Sriram is a PhD student at the University of Bristol, funded by Hewlett-Packard Labs. Ilango has a Master's degree in Computer Science from the Technical University of Munich (Germany). He spent a year as a research associate at the Hewlett-Packard Research Labs in Bristol, UK, where he worked on automated mapping of business processes to application and infrastructure configuration, and explored ways of monitoring and managing virtualised infrastructures in data centres. He started his PhD, fully sponsored by HP Labs, in Oct. 2007 and is looking into ways of understanding and modelling increasing complexity and dynamics in future generations of data centres.

AREAS OF RESEARCH

- Understanding and modelling increasing complexity and dynamics in future generations of data centres

PUBLICATIONS

- A. Khajeh-Hosseini, I. Sommerville & Ilango Sriram, Research Challenges for Enterprise Cloud Computing. *Technical Report*, 2010
- I. Sriram & D. Cliff. Component placement effects on data centre performance scaling. Manuscript submitted to *15th IEEE International Conference on the Engineering of Complex Computer Systems (ICECCS) 2010*.

MS CHARLOTTE SZOSTEK

Charlotte Szostek is a PhD student at the University of Bristol She is a member of the Bristol Centre for Complexity Science, having completed a Master of Research in Complexity Science in 2010. She completed a project with Biochemistry on The Integration of Receptor Trafficking and Signalling in Angiogenesis and a Second with Dave Cliff on Automated Algorithmic Trading. Charlotte holds a MSc in Earth Systems Science; funded by the NERC; and a BEng in Civil Engineering; during which she was a Queen's Jubilee Scholar of the Institute of Civil Engineering, receiving funding from the Institute and representing it. She started her PhD in February 2011 and is investigating automated Algorithmic Trading from a Complex System perspective. She is looking at ways to use automated trading algorithm to better

understand financial markets as complex adaptive systems; their dynamics and emergent features.

AREAS OF RESEARCH

- Automated Algorithmic Trading from a Complex System perspective

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MR DUNCAN TAIT

Duncan Tait is an EngD student at the Systems Centre run between the University of Bristol and Univesity of Bath, his sponsoring company is Thales UK. Duncan recently graduated from the University of Reading with a BSc degree in Physics. In November 2009 Duncan commenced an EngD looking into Communications Networking Simulation - specifically radio communications and complex behaviour thereof.

AREAS OF RESEARCH

- Communications Networking Simulation

DR DEREK WANG

Yuanzhi (Derek) Wang is a research fellow at the university of St Andrews. Prior to this, he was doing a PhD in Computer Science at the Australian National University, and was a research project officer at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia. He also has several years industrial experience in software development, dependable real-time control systems, systems architecture, and IT consultancy. His current research interest includes large scale socio-technical software-intensive systems, service-oriented computing, and cloud computing. In particular, his work aims to investigate and understand various critical socio-technical factors involved in the processes of cloud adoption, diffusion, and sustainability, and to facilitate these processes through pragmatic methods and tools.

AREAS OF RESEARCH

- large scale socio-technical software-intensive systems

PUBLICATIONS

[Complete publications list](#)

MR JAMES WILLIAMS

James Williams is a PhD student at the University of York. James graduated from the same university in July 2009 with a Master's degree in Computer Systems and Software Engineering and started his PhD in October 2009. His research focuses on looking at ways to exploit the use of formal methods in a model-driven engineering environment in order to improve the design, implementation and testing of large-scale complex systems.

AREAS OF RESEARCH

Current Projects:

- UtoZ
  Automatic formalisation of UML to Z: A tool developed during for my Master's thesis. The tool is an implementation of the process developed by Nuno Amalio in his [PhD thesis](#), that takes UML class and state diagrams and formalises them into a Z specification. I am currently extending the and improving the tool, as well as looking at integrating the tool with the [Community Z Tools](#) (CZT) project with the aim to provide better feedback to the user regarding the consistency of their diagrams.
- ZTlite
  A (relatively) light-weight text-editor for Z, including parser, type-checker and AST-view. Built using the [Community Z Tools project](#).