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Vision

To build a world-leading research programme in complex, adaptive, and sensor-driven systems. To see the results of this programme inform the student experience and the advancement of science.

Achievements in current post

Since moving to St Andrews I have established a research programme covering the theory and practice of complex, sensor-driven, and adaptive systems, collaborating with colleagues across the University and funded from local, national and EU sources and working within the School's Complex and Adaptive Systems group (CAS, https://casrg.cs.st-andrews.ac.uk/), of which I was a founder member.

I was elected to Scotland's national academy as a Fellow of the Royal Society of Edinburgh in 2020.

My research seeks to understand how complex adaptive systems behave. Specifically, wehave developed approaches to understanding the limits of sensing under realistic conditions: how can one continue to make decisions, and with what degree of confidence, in the face of degradation, poor placement, and partial failure? This has involved making several; significant advances in machine-learning-driven data analytics; more recently we have been exploring approaches based on network science, and specifically how the topology of interactions, and of data sets, can be leveraged to improve our understanding of the processes involved. We develop and maintain several open-source libraries that power our work, most notably for epidemic (and other) process simulation.

I was Head of School for Computer Science 2017 – 2021. I led the School by example through a period of growth in a challenging national and international environment, during which we maintained (and improved) the quality and delivery of our teaching and research as the scope and volume of our activities increased. The COVID-19 pandemic posed an immense challenge, and I managed the migration of all the School's activities online for dual delivery to students local and remote to St Andrews – a task made harder by our determination to retain the small-group, in-person, approach to teaching and learning that constitutes the main "draw" to the University. I engaged at institutional level, taking leadership roles on various committees and activities, seeking to help ensure that St Andrews continues to prosper in the right directions

From 2010 – 2017 I served as Director of Research, leading the School's participation in the UK Research Evaluation Framework (REF2014) process. I have taken a leadership role in the Scottish Informatics and Computer Science Alliance (SICSA, http://www.sicsa.ac.uk) in terms of programme development and student experience, and have served on several national committees and international journal boards.

Current main research interests

Design, analysis and programming of sensor- and data-driven adaptive systems. Interpretation of noisy data using techiques from algebraic topology and statistical machine learning. Complex networks and their application to biological and environmental modelling.

Background

Primary qualifications

DPhil Computer Science, *"An approach to scalable parallel programming"*, University of York UK 1993
BSc (hons) 1st class Computing Science, University of Newcastle upon Tyne UK 1989

Other qualifications

MA *in jure officii*, Trinity College Dublin IE 2003

Professional recognition

Fellow, Royal Society of Edinburgh 2020
Fellow, British Computer Society (Member since 1996) 2008
Chartered Engineer 1996
Member, London Mathematical Society 2017

Career

University of St Andrews UK (Professor of Computer Science) 2009 – date
University College Dublin IE (College lecturer) 2004 – 2009
Aurium Ltd IE (Founder and CEO of a research-led start-up company) 2001 – 2003
Trinity College Dublin IE (Research fellow; Lecturer) 1997 – 2001, 2003 – 2004
STFC Rutherford Appleton Laboratory UK (Research fellow; Scientific officer) 1992 – 1997

Prizes and awards

Runner-up best paper, Thirteenth IEEE International Conference on Self-Adaptive and Self-Organising Systems (SASO) 2019
Best paper, 3rd International Conference on Internet Technologies and Secured Transactions 2008
Led team shortlisted for an Irish Software Association Technical Innovation Award 2002
Best student paper (co-author), International Conference on Enterprise Information Systems 1998
Visiting scholar, US Air Force Research Laboratory, Rome NY 1998
Personal doctoral scholarship, Science and Engineering Research Council UK 1989 – 1992

Selected research funding

(All figures quoted as institutional value/total value where appropriate.)

Cloud epydemic (Oracle for Research, 2023, £30K, principal investigator.) Exploring simulation-as-a-service in a cloud environment.

Identifying community COVID-19 *cases and exploring differences with patients diagnosed in healthcare settings* (Scottish Chief Scientist's Office, 2020, £25K, co-investigator, led by the School of Medicine.) Developing an app to collect and analyse reported symptoms for suspected covid-19 infection.

Complex network approaches to antibiotic resistance (Microsoft, 2017, $20K, principal investigator, jointly with the Schools of Biology and Chemistry.) In-kind grant of cloud computing time to support simulations of the gene exchanges underlying the emergence of resistance in bacteria.

Science of Sensor Systems Software (S4) (EPSRC Programme Grant, 2016 – 2021, £920K/£4.4M, institutional principal investigator.) Formal methods applied to the development, adaptation, and verification of sensor system (`http://www.dcs.glasgow.ac.uk/research/s4`).

Sensing environmental risk (CENSIS, 2015 – 2016, £26K, principal investigator.) Proof-of-concept application of environmental sensor interpretation at a major chemical facility, in collaboration with a software SME.

Exploring transgenic mosquito dynamics using complex networks (Microsoft, 2015 – 2016, $20K, principal investigator, joint with the School of Biology.) In-kind grant of cloud computing time to support extensive simulations of mosquito spreading.

SAPERE (EU Framework 7, 2010 – 2013, €450K/€2.5M, institutional principal investigator.) Long-lived adaptive infrastructures (`http://www.sapere-project.eu`).

TEPAWSN (Xi'an Jiao Tong Liverpool University Research Development Fund, 2010 – 2012, ¥52K, international collaborator.) Formal methods applied to sensor networks.

Lero, the Irish Software Engineering Research Centre (Science Foundation Ireland, 2005 – 2010, €1M/€11M, co-investigator). Semantics, modelling and programming of autonomic systems (`http://www.lero.ie`).

Clarity (Science Foundation Ireland, 2008 – 2012, €6M/€16M, co-investigator). Middleware and programming models for power-aware wireless sensor networks (`http://www.clarity-centre.org`).

Networked embedded systems in the built environment (NEMBES) (Irish Higher Education Authority Programme for Research in 3rd-Level Institutions, 2007 – 2011, €450k/€14.5M, institutional principal investigator). Autonomic programming and management of wireless sensors embedded into physical substrates.

User-centred evaluation of pervasive systems (Enterprise Ireland, 2005 – 2008, €80K/€350K, institutional principal investigator). Design and evaluation methods for pervasive systems using semi-immersive virtual reality.

On-line Dublin Computer Science Summer School (Science Foundation Ireland, 2007 – 2010, €600K/€1.2M, co-investigator). A summer internship programme giving an international cohort of undergraduates the opportunity to work in a research environment (`http://www.odcsss.ie`).

SenseTiles (Science Foundation Ireland, 2007 – 2009, €650K, co-investigator). A framework for easily-deployed wireless sensor networks using standard ceiling tiles.

Towards a semantics of pervasive computing (Enterprise Ireland, 2005 – 2008, €350K, principal investigator). Developed models for the behaviour of pervasive systems, leading to a better understanding of the effects of sensor uncertainty.

Career totals

Principal/institutional lead investigator on grants worth over £9M

Collaborator/co-investigator on grants totalling a further £30M

Commercial funding to found and lead a start-up company, raising €650K in venture funding and growing it to a value in excess of €1.8M

Selected professional activities

Programme, policy, and standards development

UK Computing Research Committee. Elected member, 2011 – date; member of executive 2022 – date. UKCRC (`http://www.ukcrc.org.uk`) is an expert panel of the BCS aiming to promote the vitality, quality and impact of computing research in the UK.

W3C Provenance Working Group. Invited expert, 2011 – 2013. Developing a standard for recording the provenance of web objects, including scientific and sensor information.

European Research Consortium for Informatics and Mathematics. National director 2006 – 2009; vice-president, 2008 – 2009; chair of structure task group 2007 – 2009; member of strategy group, 2008 – 2009. ERCIM provides lobbying and project management for a group of 19 leading IT labs across Europe, with an annual turnover in excess of €25M (`http://www.ercim.org`).

EU Framework programmes. Invited expert and rapporteur for Situated and Autonomic Communications initiative 2003 – 2005; project reviewer, 2009 – date; proposal reviewer, 2004 – date. Invited participant in the

"Beyond the horizons" and "InterLink" projects to help set future research directions, including co-ordination with EU/NSF joint activities.

IBEC/ICT Ireland committee on academic/industrial R&D. Member 2003 – 2009; co-author of two reports on fostering research 2005. Several of the recommendations in these reports have been acted upon by government, notably the provision of vouchers to companies to conduct applied collaborative research.

Fellowship, tenure, and promotion evaluation

Fellowship evaluation. Royal Society of Edinburgh sectional committee B (Informatics, Mathematics, and Statistics), 2021 – 2023.

Tenure evaluation. Universitá di Bologna, 2021; King's College London UK, 2016; Rutgers University NJ, 2012; Drexel University PA, 2019, 2015, 2009.

Professorial recruitment panels. University College Cork IE, 2018; Oxford University UK, 2017.

Research proposal and project reviewing

Nederlandse Organisatie voor Wetenschappelijk Onderzoek NL. Talent programme reviewer, 2023.

National Sciences and Engineering Research Council of Canada CA. Discovery grant reviewer, 2023.

Medical Research Council UK. Reviewer for "Better methods, Better research" panel, 2022.

UK Research and Innovation Strategic Priorities Fund UK. Reviewer for "AI for Science and Government" at the Alan Turing Institute, 2021.

Engineering and Physical Sciences Research Council UK. Member of EPSRC College, 2008 – date.

Natural Environment Research Council UK. Proposal reviewer, 2009 – 2019.

Royal Society UK. University Research Fellowship reviewer, 2013 – 2019.

Royal Academy of Engineering Chair in Emerging Technologies scheme UK. Proposal reviewer, 2017.

European Union Framework programmes EU. Proposal reviewer, 2004 – date; project reviewer, 2011 – 2014.

Htvatska zaklada za znanost HR Proposal reviewer 2013 – 2015.

Fonds zur Förderung der wissenschaftlichen Forschung AT. Proposal reviewer 2012 – 2015.

Ministero dell'Istruzione, dell'Università e della Ricerca IT. Proposal reviewer 2012 – 2016.

Enterprise Ireland IE. Proposal reviewer, 2012 – 2017.

Dutch National Science Foundation NL. Proposal reviewer, 2011 – 2012.

Swiss National Science Foundation CH. Proposal reviewer, 2010.

Fundação para a Ciéncia e a Tecnologia PT. Proposal reviewer, 2009.

Editorial activities

Physical Research Review. Reviewer, 2020 – date.

Physical Review Letters. Reviewer, 2020 – date.

Physical Review E. Reviewer, 2016 – date.

Nature. Reviewer, 2015 – date.

ACM Transactions on Autonomous and Adaptive Systems. Reviewer, 2007 – 2011; associate editor, 2011 – 2017.

EAI Endorsed Transactions on Self-Adaptive Systems. Associate editor, 2014 – 2016.

Journal of Network and Systems Management. Guest editor 2007; member of editorial board 2007 – 2017.

International Journal of Autonomous and Adaptive Communications Systems. Member of editorial board, 2007 – 2012.

International Journal of Ambient Computing and Intelligence. Associate editor, 2008 – 2012.

Springer Verlag Birkhäuser series on Autonomic Computing. Member of editorial board, 2008 – 2014.

Computer Networks. Guest editor, 2008.

International Journal of Internet Protocol Technology. Guest editor, 2006.

IEEE Transactions on Systems, Man and Cybernetics – A. Reviewer, 2008 – 2010.

Pervasive and Mobile Computing Journal. Reviewer, 2005 – date.

SOFTWARE: Practice and experience. Reviewer, 2006 – 2015.

IEEE Communications. Reviewer, 2004 – 2012.

Computer Communications Reviewer, 2004 – 2007.

Keynotes, panels, and invited activities

Conference on Design and Architectures for Signal and Image Propcessing (DASIP), 2018. Porto, PT. Invited keynote on moving from sensors to sensor systems software.

12th IEEE International Conference on Self-Adaptive and Self-organising systems (SASO), 2018. Trento, IT. Invited panelist on the future of self-organising and autonomic systems.

SICSA panel on Getting value from your data, 2014. Invited panelist talking about complex processes on complex networks.

Swiss Doctoral Winter School, 2012. Ovronaz, CH. Invited lecture series (8 contact hours) on context-aware systems for a week-long programme in service-oriented computing.

6th International Workshop on Managing Ubiquitous Communications and Services, 2009. Invited keynote on adaptive network management.

Dagstuhl seminar on the future internet, 2009. Invited participant.

5th IEEE International Conference on Autonomic Computing, 2008. Invited panelist on managing next-generation networks.

European Telecommunications Standards Institute 1st "Infinity Initiative" workshop, 2007. Invited presentation and panelist on the internet of things.

2nd International Workshop on Self-Organising Systems, 2007. Invited panelist.

Dagstuhl seminar on resilient and survivable networks, infrastructures and services, 2007. Invited participant.

IFIP Autonomic Networking, 2006. Paris, FR. Invited keynote on programming in the presence of uncertainty.

2nd IFIP International Workshop on Autonomic Communications, 2005. Invited panelist on grand challenges in autonomic systems

Conference and workshop organisation

IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS). Steering committee, 2019 – date.

International Workshop on Engineering Collective Adaptive Systems (eCAS). Programme co-chair, 2018.

IEEE International Conference on Cloud and Autonomic Computing. Programme committee, 2013 – 2019; steering committee, 2014 – 2019.

IEEE International Conference on Autonomic Computing. Local chair 2006; workshops chair 2007; programme co-chair 2008; general co-chair 2009; member of steering committee 2007 – 2010.

IFIP/IEEE International Symposium on Integrated Network Management. Panels co-chair, 2011.

International Conference on High-Performance Computing. Programme vice-chair, 2009.

IFIP Autonomic Networking. Programme co-chair, 2006.

IEEE PERVASIVE. Publicity co-chair and local committee, 2006.

(In addition I serve on 2 – 3 international conference and workshop programme committees per year.)

Selected recent university activities

Institutional leadership

Engineering@St Andrews 2020 – date. Member of the steering committee, 2020 – date; senior theme lead for "Systems and processes", 2022 – date. E@ST is an institute to bring together all the engineering work happening across the University.

Head of School for Computer Science. 2017 – 2021. Leading the School through a period of growth in student and staff numbers, through an on-going broadening of our core and collaborative research activities, and through the REF2021 exercise. When the COVID-19 pandemic hit, dealing with lockdown and transferring all the School's activities online.

Research Excellence Board. 2018 – 2021. The board oversees the quality and direction of the university's research across faculties, particularly in relation to REF at appropriate points in the cycle.

Information Strategy Board. 2018 – 2021. The committee directs the institution's core IT, computation, and data strategies.

St Andrews Institute for Data-Intensive Research 2015 – 2019. Led the development of an inter-disciplinary institute to focus and drive the university's activities in data science and digital humanities (`http://www.idir.st-andrews.ac.uk`).

Director of Research for Computer Science. 2010 – 2017. Led School's submission to REF2014. Established structures for research assessment, proposal development and review.

Programme development

MSc in Data Science. 2015 – 2017. Helping lead the development of a new joint MSc programme between the Schools of Computer Science, and Mathematics and Statistics.

MSc programme review. 2009 – 2011. Review of St Andrews' MSc programmes in computer science, recommending migration to a "portfolio" model of modules. Member of panel implementing these recommendations.

MSc Ubiquitous and Sensor Systems. Programme director 2007 – 2009. Re-developed the curriculum and style to focus on the techniques needed for developing applications in sensor-rich environments.

MSc Advanced Software Engineering. Programme director 2004 – 2007. Grew the programme to over 30 students per year, conducting extensive liaison with local industry to guide curriculum evolution.

Current primary PhD/EngD supervision

1. Xue Guo. Complex urban networks.

Graduated PhD students

1. Dr Diego Arenas. Data analytics applied to power logistics. 2022.
2. Dr Peter Mann (co-supervisor). Generating functions applied to topics in clustered networks. 2021.
3. Dr Michael Pitcher (co-supervisor). *In silico* modelling of tuberculosis pathology. 2020.
4. Dr Chris Schneider (co-supervisor). Unsupervised machine learning for fault identification in virtualised environments. 2015.
5. Dr Lei Fang. Statistical learning for managing error behaviour of sensor networks. 2014.

6. Dr Graeme Stevenson. An approach to situation recognition based on learning semantic models. 2014.
7. Dr Saray Shai. Complex coupled networks: structure, adaptation, and processes. 2014.
8. Dr Graham Williamson (co-supervisor). Epidemic data dissemination in wireless sensor networks. 2012.
9. Dr Hui Zhang. Coverage problems in sparse and dense sensor networks. 2011.
10. Dr Susan McKeever. Situation recognition using enhanced Dempster-Shafer evidence theory. 2011.
11. Dr Emerson Louriero (co-supervisor). Optimal autonomic management of dynamic CPU shares. 2010.
12. Dr Michael Collins. Security protocols applied to wireless sensor networks. 2010.
13. Dr Stephen Knox. Situation recognition using case-based reasoning. 2010.
14. Dr Adrian Clear. Interactive specification of situations. 2009.
15. Dr Juan Ye. Semantics of pervasive computing systems. 2008.
16. Dr MA Razzaque. Cross-layer architectures for autonomic systems. 2008.
17. Dr Tim Walsh (co-supervisor). Mobile agent architectures. 2007.
18. Dr Sotirios Terzis (co-supervisor). Advanced trader architectures. 2005.

Recent modules taught

Foundations of Computing (Undergraduate level 2). Algorithms, data structures and practical computational complexity. Taught as a "flipped" module with video content preceding interactive classes.

The Internet and the Web (Undergraduate level 2). Internet architecture and protocols, with emphasis on layering and service abstractions.

Sustainable development (Graduate level 5). A lecture and discussion on applications os sensor technology to sustainable development, including material on environmental sensing and smart grids.

Component technologies (Undergraduate level 3). Modern approaches to middleware, component composition and orchestration.

"Great ideas" (Undergraduate level 1). A liberal-arts style overview of various fields, for which I contributed a lecture on the history and evolution of the internet.

Computers in everyday life (Undergraduate level 1). Two lectures on sensor systems; more recently, two lectures on complex systems.

Contextual systems (MSc/PhD). Theory and practice of designing and implementing context-aware systems.

Principles of programming languages (Undergraduate level 3). Principles underlying programming languages, informed by developing an interpreter for a simple language.

Autonomic systems (MSc/PhD). Techniques for adaptive middleware and autonomic systems.

Sensor systems (MSc/PhD). Hardware and software techniques for dealing with sensors, informed by a medium-scale project.

(In addition I have developed and delivered a number of other modules including software engineering, semantics, data structures and communications.)

Examination and administration

School benchmarking. School of Computer Science, NUI Galway IE. 2021.

Institutional teaching review. Department of Computer Science, University of York, 2015.

CPHC/BCS Distinguished Dissertations Panel. Member, 2010 – 2016; chairman, 2013 – 2015.

Programme external examination. BA(Mod) programme, Trinity College Dublin IE, 2019 – 2022. BSc (part-time) programme, University of Ulster UK, 2019 – 2022. MSc programmes, Lancaster University UK, 2013 – 2017. BSc programme, UCD Dublin IE, 2014 – 2017.

Programme certification. PGCert in Online Digital Communications, University of Ulster UK, 2011.

External PhD examination. UCD Dublin IE, 2020. University of Ulster UK, 2020. Università di Bologna IT, 2015. University of Aberdeen UK, 2014. National University of Singapore SG, 2013. Trinity College Dublin IE, 2013, 2019. University of Limerick IE, 2013. University of Southampton UK, 2012. Imperial College UK, 2011, 2015, 2020. TU Delft NL, 2011, 2022. University of Liverpool UK, 2010. University of Leicester UK, 2009. University of Strathclyde UK, 2009 – 2011. University of Lancaster UK, 2008. Institut TELECOM Sud Paris FR, 2008. University of York UK, 2006, 2013. Institut d'Informatique et Mathématiques Appliquées de Grenoble, Université Joseph Fourier FR (conducted in French), 2005. University of Sheffield UK, 1999.

Full list of publications

Submitted and under review

Simon Dobson. epyc: Computational experiment management in Python. Submitted to the Journal of Open-Source Software

Books

Simon Dobson. *Epidemic modelling – Some notes, maths, and code.* Independent Publishing Network, 2020

Journal

Andrea Rosales Sanabria, Franco Zambonelli, Simon Dobson, and Juan Ye. ContrasGAN: Unsupervised domain adaptation in human activity recognition via adversarial and contrastive learning. *Pervasive and Mobile Computing*, 2021. To appear

Peter Mann, V. Anne Smith, John Mitchell, and Simon Dobson. Symbiotic and antagonistic disease dynamics on clustered networks using bond percolation. *Physical Review E*, 104(2), 2021

Peter Mann, V. Anne Smith, John Mitchell, Christopher Jefferson, and Simon Dobson. Exact formula for bond percolation on cliques. *Physical Review E*, 104(2), 2021

Peter Mann, V. Anne Smith, John Mitchell, and Simon Dobson. Two-pathogen model with competition on clustered networks. *Physical Review E*, 103(6), June 2021

Peter Mann, V. Anne Smith, John Mitchell, and Simon Dobson. Co-operative co-infection dynamics on clustered networks. *Physical Review E*, 103(4), April 2021

Peter Mann, V. Anne Smith, John Mitchell, and Simon Dobson. Random graphs with arbitrary clustering and their applications. *Physical Review E*, 103(1), January 2021

Peter Mann, V. Anne Smith, John Mitchell, and Simon Dobson. Percolation in random graphs with higher-order clustering. *Physical Review E*, 103(1), January 2021

Antonio Bucchiarone, Mirko D'Angelo, Danilo Pianini, Giacomo Cabri, Marina De Sanctis, Mirko Viroli, Roberto Casadei, and Simon Dobson. On the social implications of collective adaptive systems. *IEEE Technology and Society Magazine*, 39(3):36–46, September 2020

Michael Pitcher, Simon Dobson, Tom Kelsey, Mark Chaplain, Derek Sloan, Stephen Gillespie, and Ruth Bowness. How mechanistic in silico modelling can improve our understanding of TB disease and treatment. *International Journal of Tuberculosis and Lung Disease*, 24(11), 2020

Lei Fang, Juan Ye, and Simon Dobson. Discovery and recognition of emerging human activities using a hierarchical mixture of directional statistical models. *IEEE Transactions on Knowledge and Data Engineering*, 32(7):1304–1316, July 2020

Michael Pitcher, Ruth Bowness, Simon Dobson, Raluca Eftimie, and Stephen Gillespie. Modelling the effects of environmental heterogeneity within the lung on the tuberculosis lifecycle. *Journal of Theoretical Biology*, 506, June 2020

Juan Ye and Simon Dobson. Xlearn: learning activity labels across heterogeneous datasets. *IEEE Transactions on Intelligent Systems and Technology*, 11(2), January 2020

Andrea Rosales Sanabria, Thomas Kelsey, Simon Dobson, and Juan Ye. Representation learning for minority and subtle activities in a smart home environment. *Journal of Ambient Intelligence and Smart Environments*, November 2019

Juan Ye, Simon Dobson, and Franco Zambonelli. Lifelong learning in sensor-based human activity recognition. *IEEE Pervasive Computing*, 18(3), July–September 2019

Simon Dobson, David Hutchison, Andreas Mauthe, Alberto Schaefer-Filho, Paul Smith, and James PG Sterbenz. Self-organisation and resilience for networked systems: Design principles and open research issues. *Proceedings of the IEEE*, 107(4):819–834, April 2019

Muffy Calder, Simon Dobson, Michael Fisher, and Julie McCann. Making sense of the world: Framing models for trustworthy sensor-driven systems. *Computers*, 7, 2018. Special issue on the 'The Emergence of the internet of things: connecting anything, anywhere?'

Michael Pitcher, Ruth Bowness, Simon Dobson, and Stephen Gillespie. A spatially heterogeneous network-based metapopulation model applied to the simulation of a pulmonary tuberculosis infection. *Applied Network Science*, 3, August 2018

Simon Dobson, Matteo Golfarelli, Simone Graziani, and Stefano Rizzi. A reference architecture and model for sensor data warehousing. *IEEE Sensors Journal*, 18, 2018

Juan Ye, Graeme Stevenson, and Simon Dobson. Detecting abnormal events on binary sensors in smart home environments. *Pervasive and Mobile Computing*, 33:32–49, December 2016

Simon Dobson, Mirko Viroli, José Luis Fernandez-Marquez, Franco Zambonelli, Graeme Stevenson, Giovanna di Marzo Serugendo, Sara Montagna, Danilo Pianini, Juan Ye, Gabriella Castelli, and Alberto Rosi. Spatial awareness in pervasive ecosystems. *The Knowledge Engineering Review*, 31(4):343–366, December 2016

Saray Shai, Dror Kenett, Yoed Kenett, Miriam Faust, Simon Dobson, and Shlomo Havlin. Critical tipping point distinguishing two types of transitions in modular network structures. *Physical Review E*, 92, December 2015

Emanuele Strano, Saray Shai, Simon Dobson, and Marc Barthélemy. Multiplex networks in metropolitan areas: generic features and local effects. *Journal of the Royal Society Interface*, 12(111), October 2015

Juan Ye, Stamatia Dasiopoulou, Graeme Stevenson, Georgios Meditskos, Efstratios Kontopoulos, Ioannis Kompatsiaris, and Simon Dobson. Semantic web technologies in pervasive computing: A survey and research roadmap. *Pervasive and Mobile Computing*, 2015. Early online

Chris Schneider, Adam Barker, and Simon Dobson. Evaluating unsupervised fault detection in self-healing systems using stochastic primitives. *EAI Endorsed Transactions on Self-Adaptive Systems*, 15(1), 2015

Franco Zambonelli, Andrea Omicini, Bernhard Anzengruber, Gabriella Castelli, Francesco DeAngelis, Giovanna di Marzo Serugendo, Simon Dobson, José-Luis Fernandez Marquez, Alois Ferscha, Marco Mamei, Stefano Mariani, Ambra Molesini, Sara Montagna, Jussi Nieminen, Danilo Pianini, Alberto Rosi, Graeme Stevenson, Mirko Viroli, and Juan Ye. Developing pervasive multiagent systems with nature-inspired co-ordination. *Pervasive and Mobile Computing*, 17:236–252, February 2015

Juan Ye, Graeme Stevenson, and Simon Dobson. USMART: an unsupervised semantic mining activity recognition technique. *ACM Transactions on Intelligent Interaction Systems*, 4(4), December 2014

Juan Ye, Graeme Stevenson, and Simon Dobson. KCAR: a knowledge-driven approach for concurrent activity recognition. *Pervasive and Mobile Computing*, 19:47–70, May 2015

M.A. Razzaque and Simon Dobson. Energy efficient sensing in wireless sensor networks using compressed sensing. *Sensors*, 14(2):2822–2859, February 2014

Abu Raihan M. Kamal, Chris Bleakley, and Simon Dobson. Failure detection in wireless sensor networks: a sequence based dynamic approach. *ACM Transactions on Sensor Networks*, 10(2), January 2014

Chris Schneider, Adam Barker, and Simon Dobson. A survey of self-healing systems frameworks. *SOFTWARE: Practice and Experience*, 2014

Savas Konur, Michael Fisher, Simon Dobson, and Stephen Knox. Formal verification of a pervasive messaging system. *Formal Aspects of Computing*, 26(4):677–694, April 2014

M.A. Razzaque, Chris Bleakley, and Simon Dobson. Compression in wireless sensor networks: a survey and comparative evaluation. *ACM Transactions on Sensor Networks*, 10(1), November 2013

Saray Shai and Simon Dobson. Coupled adaptive complex networks. *Physical Review E*, 87(4), April 2013

Abu Raihan M. Kamal, Chris Bleakley, and Simon Dobson. Packet-Level Attestation (PLA): a framework for in-network sensor-data reliability. *ACM Transactions on Sensor Networks*, 9(2), March 2013

MA Razzaque, Simon Dobson, and Kieran Delaney. Augmented materials: spatially embedded sensor networks. *International Journal of Networks and Distributed Systems*, 11(4):453–477, 2013

Saray Shai and Simon Dobson. Effect of resource constraints on intersimilar coupled networks. *Physical Review E*, 86(6), December 2012

Klaas Thoelen, Danny Hughes, Nelson Matthys, Lei Fang, Simon Dobson, Yizhou Qiang, Wei Bai, Ka Lok Man, Sheng-Uei Guan, Davy Preuveneers, Sam Michiels, Christophe Huygens, and Wouter Joosen. A reconfigurable component model with semantic type system for dynamic WSN applications. *Journal of Internet Services and Applications*, 3(3):277–290, December 2012

Juan Ye, Graeme Stevenson, Simon Dobson, Michael O'Grady, and Gregory O'Hare. Perceiving and interpreting smart home datasets with $\mathcal{PI}$. *Journal of Ambient Intelligence and Humanized Computing*, 4(6):717–729, July 2012

Emerson Loureiro, Paddy Nixon, and Simon Dobson. Decentralized and optimal control of shared resource pools. *ACM Transactions on Autonomous and Adaptive Systems*, 7, 2012

Alan Dearle and Simon Dobson. Mission-oriented middleware for sensor-driven scientific systems. *Journal of Internet Services and Applications*, 3(1):133–139, 2012

Mohamed Saad, Chris Bleakley, Tarig Ballal, and Simon Dobson. High-accuracy reference-free ultrasonic location estimation. *IEEE Transactions on Instrumentation and Measurement*, 61(6):1561–1570, June 2012

Juan Ye, Simon Dobson, and Susan McKeever. Situation identification techniques in pervasive computing: a review. *Pervasive and Mobile Computing*, 8(1):36–66, 2012

Juan Ye, Graeme Stevenson, and Simon Dobson. A top-level ontology for smart environments. *Pervasive and Mobile Computing*, 7(3):359–378, 2011

Mohamed Saad, Chris Bleakley, and Simon Dobson. Robust high accuracy ultrasonic range measurement system. *IEEE Transactions on Instrumentation and Measurement*, 60(10):3334–3341, 2011

Franco Zambonelli, Gabrialla Castelli, Laura Ferrari, Marco Mamei, Alberto Rosi, Giovanna di Marzo Serugendo, Matteo Risoldi, Akla-Esso Tchao, Simon Dobson, Graeme Stevenson, Juan Ye, Elena Nardini, Andrea Omicini, Sara Montagna, Mirko Viroli, Alois Ferscha, Sascha Maschek, and Bernhard Wally. Self-aware pervasive service ecosystems. *Procedia Computer Science*, 7:197–199, 2011

Juan Ye and Simon Dobson. Exploring semantics in activity recognition using context lattices. *Journal of Ambient Intelligence and Smart Environments*, 2(4):389–407, 2010

Susan McKeever, Juan Ye, Lorcan Coyle, Chris Bleakley, and Simon Dobson. Activity recognition using temporal evidence theory. *Journal of Ambient Intelligence and Smart Environments*, 2(3):253–269, 2010

Adrian K. Clear, Thomas Holland, Simon Dobson, Aaron Quigley, Ross Shannon, and Paddy Nixon. Situvis: a sensor data analysis and abstraction tool for pervasive computing systems. *Pervasive and Mobile Computing*, 6(5):575–589, 2010

Simon Dobson, Roy Sterritt, Paddy Nixon, and Mike Hinchey. Fulfilling the vision of autonomic computing. *IEEE Computer*, 43(1):35–41, January 2010

Graeme Stevenson, Juan Ye, Simon Dobson, and Paddy Nixon. LOC8: a location model and extensible framework for programming with location. *IEEE Pervasive Computing*, 9(1):28–37, January 2010

John Strassner, Sven van der Meer, Declan O'Sullivan, and Simon Dobson. The use of context-aware policies and ontologies to facilitate business-aware network management. *Journal of Network and Systems Management*, 17(3):255–284, September 2009

Michael Collins, Simon Dobson, and Paddy Nixon. Securing wireless sensor networks: introducing ASLAN – a secure, lightweight architecture for WSNs. *International Journal on Advances in Networks and Services*, 2(1):679–685, May 2009

Michael Collins, Simon Dobson, and Paddy Nixon. A lightweight secure architecture for wireless sensor networks. *International Journal of Internet Technology and Secured Transactions*, 2(1–2), 2009

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Eoin Bailey, Simon Dobson, and Aaron Quigley. Dynamical systems theory applied to autonomics. Poster at the IBM Centres for Advanced Study Conference (CASCON), 2007

Eoin Bailey, Simon Dobson, and Paddy Nixon. Semantics of autonomic systems. Poster at the IBM Centres for Advanced Study Conference (CASCON), 2006

Simon Dobson, Victoria Marshall, and Brian Ritchie. STICKS and STONES: architectures for modular WWW software. Poster at the 5th International World Wide Web conference, May 1996

Edited books and proceedings

Simon Dobson, John Strassner, Manish Parashar, and Onn Shehory, editors. *Proceedings of the 6th International Conference on Autonomic Computing*. ACM Press, 2009

John Strassner, Simon Dobson, José Fortes, and Kumar Goswami, editors. *Proceedings of the 5th International Conference on Autonomic Computing*. IEEE Press, 2008

Tom Pfeifer, John Strassner, and Simon Dobson, editors. *Managing ubiquitous communications and services: Proceedings of the Fourth International Workshop, MUCS 2007*. Multicon Verlag, 2007

Dominique Gaïti, Guy Pujolle, Ehab Al-Shaer, Ken Calvert, Simon Dobson, Guy Leduc, and Olli Martikainen, editors. *Autonomic Networking*, volume 4195 of *LNCS*. Springer-Verlag, 2006

Paddy Nixon, Gerard Lacey, and Simon Dobson, editors. *Managing interactions in smart environments*. Springer Verlag, 2000

Paddy Nixon and Simon Dobson, editors. *Objects, components and the virtual enterprise*. ACM Press, 1999. Workshop reader

Book chapters

Mirko Viroli, Franco Zambonelli, Graeme Stevenson, and Simon Dobson. From SOA to pervasive service ecosystems: an approach based on semantic web technologies. In Javier Cubo and Guadalupe Ortiz, editors, *Adaptive web services for modular and reusable software development: tactics and solutions*. IGI Global, 2012

Simon Dobson and Aaron Quigley. Healthcare in a pervasive world. In Jeremy Pitt, editor, *This pervasive day: the potentials and perils of pervasive computing*, pages 99–111. Imperial College Press, 2012

Simon Dobson. Co-design for context awareness in pervasive systems. In Kieran Delaney, editor, *Ambient intelligence with microsystems: augmented materials and smart objects*, volume 18 of *Microsystems*, pages 297–307. Springer Verlag, 2008

Kieran Delaney and Simon Dobson. Augmenting materials to build cooperating objects. In Kieran Delaney, editor, *Ambient intelligence with microsystems: augmented materials and smart objects*, volume 18 of *Microsystems*, pages 19–46. Springer Verlag, 2008

Juan Ye, Simon Dobson, and Paddy Nixon. An overview of pervasive computing systems. In Kieran Delaney, editor, *Ambient intelligence with microsystems: augmented materials and smart objects*, volume 18 of *Microsystems*, pages 3–17. Springer Verlag, 2008

M.A. Razzaque, Simon Dobson, and Paddy Nixon. Cross-layer optimisations for autonomic networks. In Monique Calisti, Sven van der Meer, and John Strassner, editors, *Advanced autonomic networking and communication*, Birkhäuser Whitestein series, pages 127–148. Springer Verlag, 2008

Simon Dobson. Report from the ECOOP 2004 workshop on component-oriented approaches to context-aware computing. In Jacques Malenfant and Bjarte Østvold, editors, *ECOOP'04 workshop reader*, volume 3344 of *LNCS*, pages 84–93. Springer Verlag, 2004

Strategic reports

Seán Baker, Simon Dobson, Pat Donnellan, Paul Kavanagh, Dan Maher, Tommy McCabe, Richard McQuillen, Paddy Holohan, Michael O'Connor, and Declan O'Mahony. *Successful commercialisation of R&D*. Irish Business Employers' Confederation/ICT Ireland, 2004

Seán Baker, Simon Dobson, Dan Flinter, Michael Grufferty, Paul Kavanagh, Dan Maher, Tommy McCabe, and Richard McQuillen. *Commercialisation of R&D in the ICT sector*. Irish Business Employers' Confederation/ICT Ireland, 2004

Magazine and media articles

Juan Ye and Simon Dobson. Pervasive computing needs better situation-awareness. *Awareness magazine*, January 2012

Simon Dobson, Graeme Stevenson, Graham Williamson, Stephen Knox, Matthew Stabeler, Lorcan Coyle, Steve Neely, and Paddy Nixon. Construct: towards a community middleware for pervasive computing. *PerAda Magazine*, October 2008

Simon Dobson, Steve Neely, Graeme Stevenson, Lorcan Coyle, and Paddy Nixon. Towards a platform for widespread embedded intelligence. *ERCIM News*, 67, October 2006

Simon Dobson and Kieran Delaney. Materials with intelligence. *ERCIM News*, 67, October 2006

Technical reports

Simon Dobson. Where's Waldo? or, a taxonomy for thinking about location in pervasive computing. Technical Report TCD-CS-2004-05, Department of Computer Science, Trinity College Dublin, 2004

Howard Kim and Simon Dobson. An improved approach to geographically locating web clients. Technical Report TCD-CS-2001-49, Department of Computer Science, Trinity College Dublin, 2004

Linda Farragher and Simon Dobson. Java Decaffeinated: experiences building a programming language from components. Technical Report TCD-CS-2000-22, Department of Computer Science, Trinity College Dublin, 2000

Simon Dobson. What's in an ion? Technical report, Department of Computer Science, Trinity College Dublin, 2000

Tim Walsh, Paddy Nixon, and Simon Dobson. As strong as possible mobility: an architecture for stateful object migration on the Internet. Technical Report TCD-CS-2000-11, Department of Computer Science, Trinity College Dublin, 2000

Tim Walsh, Paddy Nixon, and Simon Dobson. A review of mobility systems. Technical Report TCD-CS-2000-13, Department of Computer Science, Trinity College Dublin, 2000

Tim Walsh, Paddy Nixon, and Simon Dobson. A managed architecture for mobile distributed systems. Technical Report TCD-CS-1999-03, Department of Computer Science, Trinity College Dublin, 1999

Simon Dobson. The O2 programming language. Technical report, Department of Computer Science, Trinity College Dublin, 1998. Reference manual for the Vanilla implementation of Abadí and Cardelli's O2 language

Simon Dobson. A first taste of Vanilla. Technical Report TCD-CS-1998-20, Department of Computer Science, Trinity College Dublin, 1998

Simon Dobson. Modular parsers. Technical Report TCD-CS-1998-19, Department of Computer Science, Trinity College Dublin, 1998

Chris Tofts, Don Goodeve, and Simon Dobson. Abstraction and implementation of a lightweight distributed termination protocol. Technical Report YCS-98-307, Department of Computer Science, University of York, 1998

Simon Dobson. A common object model for large experimental systems: a proposal. Technical report, Rutherford Appleton Laboratory, 1997

Simon Dobson and Victoria Burrill. Lightweight data mark-up. Technical Report WWW/04/94, Rutherford Appleton laboratory, 1994

Simon Dobson and Victoria Burrill. Preliminary results from the database markup of hyperdocuments. Technical Report WWW/03/94, Rutherford Appleton Laboratory, November 1994

Simon Dobson. Data and hypermodels are isomorphic: manipulating hyperdocuments at a logical level. Technical Report WWW/02/94, Rutherford Appleton Laboratory, August 1994

Simon Dobson, Victoria Burrill, and Julian Gallop. Semantic mark-up of generalised documents. Technical Report WWW/01/94, Rutherford Appleton Laboratory, August 1994

Simon Dobson. An introduction to the theories of bulk data types. Technical report, Rutherford Appleton Laboratory, 1994

Simon Dobson. Writing compilers using ML. Technical Report PPG/99/93, Rutherford Appleton Laboratory, 1993

Simon Dobson. *An approach to scalable parallel programming.* PhD thesis, Department of Computer Science, University of York, 1993

Simon Dobson. How good is my dataset? Invited talk to the MAKI (Multi-mechanism Adaptations for the Future Internet) workshop on Autonomous decision-making in networked systems under uncertainty, February 2020

Simon Dobson. Understanding sensing from a more formal perspective. Invited talk at the Scottish Symposium on Formal Methods for Verification and Synthesis, September 2019

Simon Dobson. Making the transition from sensors to sensor systems. Keynote at the Conference on Design and Architectures for Signal and Image Processing (DASIP'18), October 2018

Lei Fang and Simon Dobson. When things get noisy: programming in the face of ubiquitous uncertainty. Invited talk at the International Conference on Cloud and Autonomic Computing (CAC'14), September 2014

Simon Dobson. Ubiquitous autonomic management. Keynote presentation at the 6th International Workshop on Managing Ubiquitous Communications and Services, 2009

Simon Dobson. Autonomic networking: achieving stability in the face of pervasive uncertainty. Keynote presentation at Autonomic Networking, 2006

Talks

Simon Dobson. Exploring epidemic spreading using network models. Invited talk to the Institute of Mathematics and its Applications (North-West branch), December 2020

Simon Dobson. A possible smeared phase transition in epidemic track-and-trace. School seminar, School of Computer Science, University of St Andrews, October 2020

Simon Dobson. Minimal sensing: the target counting problem. Invited talk in the St Andrews Institute for Data-Intensive Research 'Summer of Data' series, June 2017

Simon Dobson, Juan Ye, and Lei Fang. Making sense of sensing. Invited talk to the Department of Computer Science, University of York, February 2017

Simon Dobson. Modelling urban networks: some results and their limitations. Talk in the Leeds Applied Nonlinear Dynamics seminar series, University of Leeds, March 2016

Simon Dobson. A complex cocktail of networks and reality. Presentation at the St Andrews Big Data and Discrete Mathematics Symposium, February 2016

Simon Dobson and Saray Shai. Complex networks and complex processes. Invited talk to the Department of Computer Science, University of York, March 2014

Simon Dobson. From Forth to Tay: a component-based extensible virtual machine for compact programs. Invited talk to the School of Computing, University of Kent, November 2012

Simon Dobson. Mission maybe possible: Improving the programming model for wireless sensor networks. Invited talk at the IDEAS Institute, Robert Gordon University, March 2012

Simon Dobson. The computer is the new microscope. Professorial inaugural lecture, University of St Andrews, December 2011

Simon Dobson and Juan Ye. Sensor and sense-ability: building systems in the face of uncertainty. Invited talk for the Edinburgh Branch of the British Computer Society, February 2011

Simon Dobson. Progamming for adaptive sensor networks: back to the future. Invited talk to the IFIP WG2.11 workshop on Generative Programming, March 2010

Simon Dobson. Semantic challenges of adaptive systems. Invited talk at the Department of Computer Science, University of Liverpool, 2009

Simon Dobson. Controlling sensors through physics: some ideas for the well-founded control of mobile sensor networks. Invited talk at the Stevens Institute of Technology, 2009

Simon Dobson. What is the correct semantic basis for adaptive systems? Invited talk in the Lero Foundations series, 2009

Simon Dobson. An adaptive systems perspective on network calculus. Invited talk at Rutgers University, 2008

Steve Neely, Graham Williamson, Hui Zhang, Graham Stevenson, and Simon Dobson. Device positioning using smart Zigbee beacons. Presentation at the Tyndall National Institute's National Access Programme open day, 2008

Simon Dobson. Towards an integrated internet of things. Invited presentation at the joint ERCIM/ETSI Infinity Initiative seminar series, 2007

Simon Dobson. From adaptive systems to adaptive spaces. Invited presentation at the Dagstuhl seminar on Resilient and Survivable Networks, Infrastructures and Services, 2007

Simon Dobson and Juan Ye. A simple semantic model for adaptive pervasive systems. Invited talk to the Department of Computer Science, University of Leicester UK, 2006

Simon Dobson. Nirvana: work-in-progress. Invited talk to the Department of Computer Science, Stevens Institute of Technology, Hoboken NJ, 2005

Simon Dobson. Towards a semantics of pervasive computing. Invited talk to the Department of Computing and Information Sciences, University of Strathclyde, and the Department of Computer Science, University College Dublin, 2004

Simon Dobson. Putting research to work. Invited talk to the Irish Business Employers' Confederation, 2003

Simon Dobson. Space is the computer. Invited talk to the Oxford University Computing Laboratory, 2000

Simon Dobson. Building programming languages from components. Invited talk to the Microsoft Research Institute, 2000

Simon Dobson. Fragmenting languages. Invited talk to the Department of Computer Science, California Institute of Technology, 1998

Simon Dobson. Correctly formalising the wrong things. Invited talk to the Irish Formal Methods Symposium, 1997

Simon Dobson and Victoria Burrill. Federated world wide webs. Invited talk to the Department of Computer Science, University of Cardiff, 1996

Simon Dobson. Weak coherence with shared abstract data types. Invited talk to the Department of Computer Science, University of Manchester, 1996