Curriculum Vitae — Rob Saunders

Associate Professor in Computational Creativity, The Games Academy, Falmouth University
Senior Research Fellow, Design Lab, Faculty of Architecture, Design and Planning, Sydney University
Associate Researcher, Creative Robotics Lab, Faculty of Art and Design, University of NSW

Profile

Dr Saunders is *Associate Professor in Computational Creativity* in the Games Academy at Falmouth University, *Senior Research Fellow* in The Design Lab, Faculty of Architecture, Design and Planning (FADP) at the University of Sydney, Australia and *Adjunct Researcher* in the Creative Robotics Lab, Faculty of Art & Design at the University of New South Wales.

Dr Saunders was awarded a Doctor of Philosophy by the University of Sydney in 2002 for his work at the Key Centre of Design Computing and Cognition on *Curious Design Agents and Artificial Creativity*. Dr Saunders' doctoral dissertation developed computational models of individual, social and cultural creativity and applied these models to Design Computing and Computational Creativity. Prof. Simeon Simoff, Dean of the School of Computing, Engineering and Mathematics at the Western Sydney University, pronounced his doctoral dissertation was "nothing less than the definition of a new area of research in design computing".

Dr Saunders' research has made significant contributions to the fields of Computational Creativity and Design Computing, opening up new areas of research in the computational modelling of intrinsic motivations in creative design systems, the use of multi-agent systems to computationally study social and cultural aspects of creativity, and the embodiment of creative, material processes through the development of creative, social and architectural robotics. In particular, his work on the computational modelling of social creativity has proven to be influential and has recently been included in *Readings in Computational Creativity*, a collection of canonical papers on the subject. His research has been praised in Ecologies of Invention (University of Sydney Press, 2013: 51) by Professor Dan Lovallo "[Saunders] is breaking new ground on modelling creativity algorithmically…In Saunders' model, creativity is a function of both an algorithm's individual evaluations of creativity combined with emergent social definitions of creativity. That is, the robots individually define what is creative based upon their own set of interactions with the environment, and thereby influence emergent social definitions of creativity".

Dr Saunders is internationally recognised as a leader in the Computational Creativity research community. He has held positions on the Steering Committee for the International Conference for Computational Creativity and the Advisory Board for the Association of Computational Creativity. Dr Saunders is regularly invited to speak on the subject of Computational Creativity and Creative AI to academic, industry and public audiences.

Education

PhD (Architecture), University of Sydney, 1997–2002

Graduate Certificate (Higher Education), University of Sydney, 2007

BSc (Computer Science & Artificial Intelligence), 1st Class Honours, University of Edinburgh, 1991–1995

Professional Experience

Dr Saunders has worked across a range of disciplines including Computer Science, Artificial Intelligence, Architecture and Design. Dr Saunders' professional experience includes creative research collaborations with artists and designers, working on a number of cutting-edge projects including robotic art installations that have been exhibited internationally and generative design systems that have been applied in commercial settings. Dr Saunders has a wealth of experience as a team leader, having managed multi-year research projects and having held the positions of Associate Dean of Learning and Teaching and Head of the Design Lab in the Faculty of Architecture, Design and Planning at the University of Sydney, and currently as Co-Director of the MetaMakers Institute at Falmouth University.

Associate Professor in Computational Creativity & Co-director of the MetaMakers Institute, Falmouth University, Cornwall, UK, 2016–present. Research and leadership in the computational creativity for casual game design.

Senior Research Fellow, Design Lab, Sydney School of Architecture, Design and Planning, University of Sydney, Australia, 2016–present. Management and implementation of research programme for Performative Body Mapping.

Director & Co-Founder, Imaginative AI Ltd, UK, 2016–2018. Co-founder of company with the aim of commercialising research in computational creativity, initially focussed on causal game creation and education.

Adjunct Researcher, Creative Robotics Lab, UNSW | Art & Design, Australia, 2014–present. Research and development of social robotics.

Head of the Design Lab, The Design Lab, FADP, University of Sydney, Australia, 2013–2016. Management of research and teaching programmes in the Design Lab.

Associate Dean (Education), The Design Lab, FADP, University of Sydney, Australia, 2008–2010, 2012. Strategic planning and implementation of initiatives, grants and procedures to promote excellence in learning and teaching.

Senior Lecturer, The Design Lab, FADP, University of Sydney, Australia, 2010–2016. Developed and taught new units of study for undergraduate and postgraduate students in Design Computing and M.IDEA.

Lecturer, The Design Lab, FADP, University of Sydney, Australia, 2006–2009. Developed and taught new units of study for undergraduate and postgraduate students in Design Computing.

Visiting Lecturer, City University, London, UK, 2003–2006. Redeveloped and taught 'System Architecture' for 1st year undergraduate computer science and software engineering students. Redeveloped and taught 'Networks and Operating Systems' to Masters students. Developed teaching pack and taught core modules for new degree in Computer Science and Games Technology.

Partner and Co-Founder, Jenkins & Saunders LLP, Bath, UK, 2005–2006. Designed and developed intelligent flight map layout system for airlines and airports web sites.

Research Fellow, Westminster University, London, UK, 2004–2006. Design and development of sophisticated agent-based models of stem cell development with Prof. Mark d'Inverno.

Consultant, Thomson & Craighead, London, UK, 2005. Developed custom text-to-speech system for the artists Thomson & Craighead for use in their work the Automated Beacon.

Consultant, Washington University, Seattle, USA, 2005. Design and development of an intelligent mail filtering and web search system for an installation artwork, Difference Engine, with James Coupe.

Visiting Lecturer, South Bank University, UK, 2005. Developed and taught a six week course on Computer Programming for Media Arts students using the Processing development environment.

Visiting Lecturer, Sussex University, Brighton, UK, 2005. Taught course on Creative Artificial Intelligence Systems to Masters students at world renowned Centre for Research in Cognitive Science (COGS).

Consultant, Flightmaps Ltd, London, UK, 2004. Designed and developed an airline flight map layout system as part of a travel consultant support system that is used by major high-street travel agents in the UK.

Consultant, South Bank University, London, UK, 2003–2004. Designed and developed a distributed intelligent system spread across nine galleries as part of the artwork 9PIN++ with artists James Coupe and Hedley Roberts.

Consultant, Westminster University, London, UK, 2003–2004. Designed and developed a computational model of stem cell development in collaboration with Prof. Jane Prophet, Prof. Mark d'Inverno, and Neil Theise, M.D.

Consultant, Tribal DDB, London, UK, 2002–2003. Designed and implemented a distributed multi-agent system to generate logos within the conceptual space of the company's design.

Visiting Lecturer, Greenwich University, UK, 2002. Developed and taught a module on Introduction to Computer Programming for undergraduate architecture students.

Research Assistant, Key Centre of Design Computing, University of Sydney, Australia, 1997–2001. Research and development of a novel hierarchical co-evolutionary model of design [16, 93].

Graduate Engineer, CRL Ltd, London, UK, 1993, 1994, 1995–1996. Research and development of a number of commercial projects using artificial intelligence, data visualisation and web technologies for parallel code optimisation, data mining and text retrieval.

Research Grants

Dr Saunders has been successful in attracting and managing external competitive research grants, exceeding the equivalent of €800,000 from funding agencies in Australia, UK and Austria, including two ARC Discovery Projects (DP0666584 & DP160104706), one Arts & Humanities Research Council grant (The Augmented Telegrapher), a FWF PEEK grant (AR545) and industry funding for collaborative retail robotics.

1. **Saunders, R.** and Maher, M.L. (2006) ***Curious Places: Agent-Mediated Self-Aware Worlds***, Australian Research Council Discovery Project [DP0666584] (A$225,000)
2. Gemeinboeck, P. and **Saunders, R.** (2016) ***The Performative Body-Mapping (PBM) Method for Socialising Non-humanlike Robots***, Australian Research Council Discovery Project [DP160104706] (A$244,942)
3. **Saunders, R.** (2015) ***Visions of Sandstone: Reducing cost and increasing safety of heritage infrastructure inspection using aerial robotics***, Henry Halloran Trust, Blue Sky Project Grant (A$21,440)
4. Krzywinska, T., Powley, E., **Saunders, R.** and Scott, M. (2017–2018) ***The Augmented Telegrapher: Multi-player Mixed Reality in a Museum Context***, Arts & Humanities Research Council (£70,145)
5. Niemelä, M., **Saunders, R.**, Dunstan, B., Alessandra, F. and Hausler, M.H. (2017) ***Cobot Teamwork: Multiple collaborative robot-human interaction***, Industry Funding—Niska/Luka (A$197,065)
6. Gemeinboeck, P., **Saunders, R.** (2019) ***Dancing with the Nonhuman: An Aesthetics of Encounter***, FWF Programm zur Entwicklung und Erschließung der Künste (PEEK) [Project: AR545] (EUR364,000)

Dr Saunders has also been successful in attracting and managing internal competitive grants, totalling more that A$500,000, to support research and teaching initiatives in my Faculty.

1. Saunders, R. (2007) ***Computational Models of Creative Domains***, University of Sydney, Early Career Researcher Grant (A$18,000)
2. Saunders, R. (2007) ***Smartslab: A Large-scale Media Façade***, University of Sydney, Major Equipment Grant (A$123,635)
3. Saunders, R. (2010) ***Promoting Standards-Based Assessment in Studio Teaching in Engineering and Architecture***, University of Sydney, Teaching Improvement Project Grant (A$49,000)
4. Saunders, R. (2010) ***Peep: A flexible online learning environment for teaching computer programming to design students***, University of Sydney, Teaching Improvement and Infrastructure Scheme (A$5,000)
5. Saunders, R. (2013) ***Creation of a Large-scale Digital Fabrication Lab***, University of Sydney, Major Equipment Grant (A$152,900)
6. Saunders, R. (2014) ***Architectural Robotics Lab***, University of Sydney, Major Equipment Grant (A$143,300)
7. Saunders, R. (2015) ***Blended Learning Studio: Evaluating Blended Learning for Teaching Foundational Skills in Design Studio***, University of Sydney, Large Educational Innovation Grant (A$30,200)

Research Publications

Dr Saunders' is an established researcher with an international reputation for innovation in the fields of Computational Creativity and Design Computing, as demonstrated by his record of over 100 publications in international peer-reviewed conferences, journals and books. Dr Saunders' achievements in these fields include the development of new agent-based approaches to modelling individual creativity using curious design agents; development of new computational models of social creativity that exhibit dynamics observed in human societies; and the application of models of curiosity to build proactive intelligent environments (ARC DP0666584) and social robots (ARC DP160104706). Dr Saunders' dissertation has had significant influence on the field of Computational Creativity, has been cited more than 120 times, and is used as a text for teaching the subject at Helsinki University. Information on Dr Saunders' citation record can be found on his Google Scholar profile page, including his h-index (15) and i10-index (21).

Doctoral Thesis

1. **Saunders, R.** (2002) ***Curious Design Agents and Artificial Creativity***, PhD Thesis, University of Sydney

Edited Books

2. Reinhardt, D., **Saunders, R.** and Burry, J. (2016) ***Robotic Fabrication in Architecture, Art and Design 2016***, Springer International Publishing, Switzerland, ISBN: 978-3-319-26376-2
3. Maher, M.L., Veale, T., **Saunders, R.** and Bown, O. (2013) ***Proceedings of the Fourth International Conference on Computational Creativity***, University of Sydney, Australia

Book Chapters

4. **Saunders, R.** (in press) ***Multi-Agent Based Models of Social Creativity*** in T. Veale and F.A. Cardosa (eds) Readings in Computational Creativity, Springer
5. Gemeinboeck, P. and **Saunders, R.** (2016) ***Towards Socializing Non-anthropomorphic Robots by Harnessing Dancers' Kinesthetic Awareness*** in J.T.K.V. Koh, B.J. Dunstan, D. Silvera-Tawil and M. Velonaki (eds) Cultural Robotics: First International Workshop, CR 2015, Held as Part of IEEE RO-MAN 2015, Kobe, Japan, August 31, 2015. Revised Selected Papers, Vol. 9549 of LNAI, Springer, 85–97
6. Gemeinboeck, P. and **Saunders, R.** (2016) ***The Performance of Creative Machines*** in J.T.K.V. Koh, B.J. Dunstan, D. Silvera-Tawil and M. Velonaki (eds) Cultural Robotics: First International Workshop, CR 2015, IEEE RO-MAN 2015, Kobe, Japan, August 31, 2015. Revised Selected Papers, Vol. 9549 of LNAI, Springer, 159-172
7. Niemela, M., Horlyck, S., Alarcon-Licona, S., Wozniak-O'Connor, D., Ulacco, G., Watt, R. and **Saunders, R.** (2016) ***BotBar: A Platform for Multi-disciplinary Design Education*** in D. Reinhardt, R. Saunders and J. Burry (eds) Robotic Fabrication in Architecture, Art and Design 2016, Springer, 251–262
8. Dubor, A., Camprodom, G., Diaz, G.B., Reinhardt, D., **Saunders, R.**, Dunn, K., Niemela, M., Horlyck, S., Alarcon-Licona, S., Wozniak-O'Connor, D. and Watt, R. (2016) ***Sensors and Workflow Evolutions: Developing a Framework for Instant Robotic Toolpath Revision*** in D. Reinhardt, R. Saunders and J. Burry (eds) Robotic Fabrication in Architecture, Art and Design 2016, Springer, 411–426
9. Carvalho, L., Goodyear, P., Wardak D. and **Saunders, R.** (2014) ***Peep: Peer Support for Programming*** in L. Carvalho and P. Goodyear (eds) The Architecture of Productive Learning Networks, Routledge, 79–94
10. Bown, O., Gemeinboeck, P. and **Saunders, R.** (2014) ***The Machine as Autonomous Performer*** chapter in L. Candy and S. Ferguson (eds) Interactive Experience in the Digital Age. Evaluating New Art Practice, Springer Series on Cultural Computing, 75–90
11. Gemeinboeck, P. and **Saunders, R.** (2013) ***Inventing Cultural Machines*** in A. Dong, J. Conomos and B. Buckley (eds) Ecologies of Invention, Sydney University Press, 37–48

12. d'Inverno, M., Howells, P., Montagna, S., Roeder, I. and **Saunders, R.** (2009) ***Agent-Based Modeling of Stem Cells*** in A.M. Uhrmacher and D. Weyns (eds) Multi-Agent Systems: Simulation and Applications, Taylor & Francis Group, 389–418
13. **Saunders, R.** (2007) ***Towards a Computational Model of Creative Societies Using Curious Design Agents***, in Engineering Societies in the Agents World VII, Vol. 4457 of LNAI, Springer, 340–353
14. **Saunders, R.** (2006) ***Case Study—Programming for Design: Rob Saunders*** in A. Dewdney and P. Ride (eds) The New Media Handbook, Routledge, New York, 125–130
15. d'Inverno, M. and **Saunders, R.** (2005) ***Agent-based Modelling of Stem Cell Organisation in a Niche*** in Engineering Self-Organising Systems, Vol. 3464 of LNAI, Springer, 52–68
16. Rosenman, M.A. and **Saunders, R.** (2003) ***Hierarchical Co-evolution for Non-routine Design*** in N. E. Mastorakis, C. Manikopoulos, G. E. Antoniou, V. M. Mladenov and I. F. Gonos (eds), Recent Advances in Intelligent Systems and Signal Processing, WSEAS Press, 457:126–131

Refereed Journals

17. Gaudl, S.E., Nelson, M.J., Colton, S., **Saunders, R.**, Powley, E.J., Perez Ferrer, B., Ivey, P. and Cook, M. (2018) ***Rapid Game Jams with Fluidic Games: A User Study & Design Methodology***, Entertainment Computing, **27**:1–9
18. Carvalho, L. and **Saunders, R.** (2018) ***Coding, Designing and Networking: Fostering Learning Through Social Connections***, Research in Learning Technology, **26**
19. **Saunders, R.** and Bown, O. (2015) ***Computational Social Creativity***, Artificial Life, Special Issue on Art, Creativity and Culture, MIT Press, Summer 2015, **21**(3):366–378
20. Grace, K., Gero, J.S. and **Saunders, R.** (2015) ***Interpretation-driven Mapping: A Framework for Parallel Search and Re-representation for Computational Analogy in Design***, AIEDAM, Special Issue on Analogical Thinking, May 2015, **29**(2):185–201
21. Kerh, T., Lu, H. and **Saunders, R.** (2014). ***Investigating Nonlinear Shoreline Multiperiod Change from Orthophoto Map Information by Using a Neural Network Model***, Mathematical Problems in Engineering, Vol. 2014, Article ID 782525, 9 pages, https://doi.org/10.1155/2014/782525
22. Kerh, T. Lu, H. and **Saunders, R.** (2014) ***Shoreline Change Estimation from Survey Image Coordinates and Neural Network Approximation*** in Int. Journal of Civil, Environmental, Structural, Construction and Architectural Engineering, **8**(4):381–386
23. Kerh, T., Lin, Y. and **Saunders, R.** (2013) ***Seismic Design Value Evaluation Based on Checking Records and Site Geological Conditions Using Artificial Neural Networks,*** Abstract and Applied Analysis, Vol. 2013, Article ID 242941, 12 pages, https://doi.org/10.1155/2013/242941
24. **Saunders, R.** (2012) ***Towards Autonomous Creative Systems: A Computational Approach,*** Cognitive Computation, September 2012, **4**(3):216–225
25. Gemeinbeock, P. and **Saunders, R.** (2011) ***Urban Fictions: A Critical Reflection on Locative Art and Performative Geographies***, Digital Creativity, Taylor & Francis, **22**(3):160–173
26. Gemeinboeck, P. and **Saunders, R.** (2011) ***Other Ways Of Knowing: Embodied Investigations of the Unstable, Slippery and Incomplete***, The Fibre Culture Journal, Trans, **18**:9–33.
27. Gemeinboeck, P., Traenkle, M., Dement, L., PRINZGAU/podgorschek and **Saunders, R.** (2010) ***On Track: A Slippery Mechanic-Robotic Performance***, Leonardo, MIT Press, October 2010, **43**(5):488–489
28. Kerh, T., Lai, J.S., Gunaratnam, D. and **Saunders, R.** (2008) ***Evaluation of Seismic Design Values in the Taiwan Building Code by Using Artificial Neural Network***, Computer Modeling in Engineering and Sciences, **26**(1):1–12
29. **Saunders, R.** and Gero, J. S. (2004) ***Situated Design Simulations using Curious Agents***, AIEDAM, Special Issue, May 2004, **18**(2):153–161
30. Rosenman, M.A. and **Saunders, R.** (2003) ***Self-regulatory Hierarchical Coevolution***, AIEDAM, November 2003, **17**(4):273–285

Refereed Conferences

31. Casas-Roma, J., Nelson, M.J., Arnedo-Moreno, J., Gaudl, S.E., **Saunders, R.** (2019) ***Towards Simulated Morality Systems: Role-Playing Games as Artificial Societies***, Proc. Int. Conf. on Agents and Artificial Intelligence.
32. **Saunders, R.** and Gemeinboeck, P. (2018) ***Performative Body Mapping: A Creative Robotics Method for Learning Expressive Movement***, Proc. of NIPS 2018, Workshop on Machine Learning for Creativity and Design, 8 Dec., Montreal, Canada.
33. Gemeinboeck, P. and **Saunders, R.** (2018) ***Human-Robot Kinesthetics: Mediating Kinesthetic Experience for Designing Affective Non-humanlike Social Robots***, Proc. of the 27th IEEE Int. Conf. on Robot and Human Interactive Communication (RO-MAN) 2018, Nanjing, China, 27–31 August 2018
34. **Saunders, R.** and Gemeinboeck, P. (2018) ***Performative Body Mapping for Designing Expressive Robots***, Proc. 9th Int. Conf. on Computational Creativity (ICCC 2018), 25–29 June, Salamanca, Spain, 280–287
35. Colton, S., Nelson, M.J., Powley, E.J., Gaudl, S.E., **Saunders, R.**, Perez Ferrer, B., Ivey, P. and Cook, M. (2018) ***A Parameter-Space Design Methodology for Casual Creators***, Proc. 9th Int. Conf. on Computational Creativity (ICCC 2018), 25–29 June, Salamanca, Spain, 264–271
36. Colton, S., Pease, A. and **Saunders, R.** (2018) ***Issues of Authenticity in Autonomously Creative Systems***, Proc. 9th Int. Conf. on Computational Creativity (ICCC 2018), 25–29 June, Salamanca, Spain, 272–279

37. Krzywinska, T., Lee, J.R., Parker, A., Powley, E.J., **Saunders, R.**, Brown, D. and Scott, M.J. (2018) ***On the Design of Collaborative Mixed-Reality Experiences for Glam Spaces: The Case of the Augmented Telegrapher for Porthcurno Museum***, Video Games and Museums: Educational Digital Tools for the Participatory GLAM Space, 6–7 May 2018, Helsinki, Finland
38. Nelson, M.J., Gaudl, S.E., Colton, S., Powley, E.J., Perez Ferrer, B., **Saunders, R.**, Ivey, P. and Cook, M. (2017) ***Fluidic Games in Cultural Contexts***, Proc. 8th Int. Conf. on Computational Creativity, 175–182
39. Nelson, M.J., Gaudl, S.E., Colton, S., **Saunders, R.**, Powley, E.J., Ivey, P., Perez Ferrer, B., and Cook, M. (2017) ***Design Methods for Democratising Mobile Game Design***, Proc. CHI Play Workshop: Critical Reflections on Participation in Game Development
40. Powley, E.J., Nelson, M.J., Gaudl, S.E., Colton, S., Perez Ferrer, B., **Saunders, R.**, Ivey, P. and Cook, M. (2017) ***Wevva: Democratising Game Design***, Proc. 13th AAAI Conf. on Artificial Intelligence and Interactive Digital Entertainment (AIIDE-17), 273–275
41. Gemeinboeck, P. and **Saunders, R.** (2017) ***Movement Matters: How a Robot Becomes Body***, Proc. 4th Int. Conf. on Movement Computing (MOCO'17), London, ACM
42. Gaudl, S.E., Nelson, M.J., Colton, S., **Saunders, R.**, Powley, E.J., Ivey, P., Perez Ferrer, B. and Cook, M. (2017) ***Exploring Novel Game Spaces with Fluidic Games***, Proc. AISB 2017 Symposium: AI & Games, Bath, 344–347
43. Nelson, M.J., Colton, S., Powley, E.J., Gaudl, S.E., Ivey, P., **Saunders, R.**, Pérez Ferrer, B. and Cook M. (2017) ***Mixed-initiative Approaches to On-device Mobile Game Design***, Proc. CHI 2017 Workshop on Mixed-Initiative Creative Interfaces
44. Colton, S., Nelson, M.J., **Saunders, R.**, Powley, E.J., Gaudl, S.E. and Cook M. (2016) ***Towards a Computational Reading of Emergence in Experimental Game Design***, 2nd ICCC Computational Creativity and Games Workshop
45. Powley, E.J., Gaudl, S.E., Colton, S., Nelson, M.J., **Saunders, R.** and Cook, M. (2016) ***Automated Tweaking of Levels for Casual Creation of Mobile Games***, 2nd ICCC Computational Creativity and Games Workshop
46. Powley, E.J., Colton, S., Gaudl, S.E., **Saunders, R.** and Nelson, M.J. (2016) ***Semi-Automated Level Design via Auto-playtesting for Handheld Casual Game Creation***, Proc. 2016 IEEE Conference on Computational Intelligence and Games, 372–379
47. Guckelsberger, C., Salge, C., **Saunders, R.** and Colton, S. (2016) ***Supportive and Antagonistic Behaviour in Distributed Computational Creativity via Coupled Empowerment Maximisation,*** Proc. 7th Int. Conf. Computational Creativity, Paris, 9–16.
48. Gemeinboeck, P. and **Saunders, R.** (2015) ***Towards Socializing Non-anthropomorphic Robots By Harnessing Dancers' Kinesthetic Awareness***, Workshop on Social HRI: Overcoming Barriers Through Appearance, Behaviour and Context-Based Design at IEEE RO-MAN 2015, Kobe, Japan
49. Gemeinboeck, P. and **Saunders, R.** (2015) ***The Performance of Creative Machines***, Workshop on Cultural Robotics: Robots as Participants and Creators of Culture at IEEE RO-MAN 2015, Kobe, Japan
50. Fernando, S., **Saunders, R.** and Weir, S. (2015) ***Digital Stereotomy—The Rejuvenation of Stone Masonry***, Proc. 16th Int. Conf. CAAD Futures 2015, Sao Paulo, Brazil
51. Fernando, S., **Saunders, R.** and Weir, S. (2015) ***Surveying Stereotomy: Investigations in Arches, Vaults and Digital Stone Masonry*** in Future of Architectural Research: ARCC 2015 Conference, Chicago
52. Zhang, A. and **Saunders, R.** (2014) ***Exploring Conceptual Space in Language Games Using Hedonic Functions***, Proc. 5th International Conference on Computational Creativity, Ljubljana, Slovenia
53. Bown, O., **Saunders, R.** and Tomitsch, M. (2014) ***A Survey of Programmers' Practices for Handling Complexity in Creative Coding***. xCoAx 2014: Second Conference on Computation, Communication, Aesthetics and X, Porto, Portugal: Universidade do Porto
54. **Saunders, R.** and Gemeinboeck, P. (2014) ***Accomplice: Creative Robotics and Embodied Computational Creativity***, 50th Annual Convention of the Society for the Study of Artificial Intelligence and the Simulation of Behaviour (AISB 2014), London
55. Gemeinboeck, P. and **Saunders, R.** (2014) ***Towards a Performative Body Mapping Approach***, 50th Annual Convention of the Society for the Study of Artificial Intelligence and the Simulation of Behaviour (AISB 2014), London
56. Gemeinboeck, P. and **Saunders, R.** (2013) ***Creative Machine Performance: Computational Creativity and Robotic Art*** in Proc. 4th Int. Conf. on Computational Creativity, 215–219
57. **Saunders, R.**, Chee, E. and Gemeinboeck, P. (2013) ***Evaluating Human-Robot Interaction with Embodied Creative Systems*** in Proc. 4th Int. Conf. on Computational Creativity, 205–209
58. Grace, K., Gero, J. and **Saunders, R.** (2013) ***Learning How to Reinterpret Creative Problems*** in Proc. 4th Int. Conf. on Computational Creativity, 113–117
59. Kocaballi, A. B., Gemeinboeck, P., **Saunders, R.**, Dong, A. and Loke, L. (2013) ***Interplay of Scripts and Resistance in a Participatory Workshop*** in Proc. 19th International Symposium of Electronic Art (ISEA 2013), Sydney
60. Grace, K., Gero, J. and **Saunders, R.** (2012) ***Representational Affordances and Creativity in Association-based Systems*** in Proc. 3rd Int. Conf. on Computational Creativity, Ireland, 195–202
61. Grace, K., Gero, J. and **Saunders, R.** (2012) ***Constructing Computational Associations Between Ornamental Designs*** in Beyond Codes and Pixels: CAADRIA 2012, CAADRIA, Hong Kong, 37–46

62. Zhang, A. and **Saunders, R.** (2012) ***Towards the Evolution of a Language for Creative Design*** in Proc. 2012 IEEE Congress on Evolutionary Computation (CEC), Brisbane, 10–15 June 2012, 2778–2783
63. Kocaballi, A. B., Gemeinboeck, P., **Saunders, R.**, Dong, A. and Loke, L. (2012) ***Embracing Relational Agency in Design Process*** in Design and Semantics of Form and Movement: Proc. DESFORM 2012, Wellington
64. Kocaballi, A. B., Gemeinboeck, P., **Saunders, R.**, Dong, A. and Loke, L. (2012) ***Transformations, Enactments, and Distrust in Promoting Multiplicity in Design Process***, Participatory Innovation Conference PIN-C2012, Melbourne
65. Hespanhol, L., Sogono, M.C., Wu, G., **Saunders, R.** and Tomitsch, M. (2011) ***Elastic Experiences: Designing Adaptive Interaction for Individuals and Crowds in the Public Space*** in Proc. 23rd Australian Computer-Human Interaction Conference (OzCHI'11), ACM, New York, 148–151
66. Gemeinboeck, P. and **Saunders, R.** (2011) ***Rethinking Machine Agency: From Cybernetic to Robotic Art***, Rewire 2011: Fourth Int. Conf. on the Histories of Media Art, Science and Technology, Liverpool, 28–30
67. Gemeinboeck P. and **Saunders, R.** (2011) ***Material Matters: Machine Agency and Performativity*** in Proc. 17th Int. Symposium on Electronic Art (ISEA 2011), Istanbul, 14–21
68. Kocaballi, A.B., Gemeinboeck, P., **Saunders, R.**, Dong, A., Loke, L. (2011) ***Multiplicity Through Connectivity: Investigating Body-Technology-Space Couplings in Participatory Activities*** in Proc. 23rd Australian Computer-Human Interaction Conference: Design, Culture and Interaction (OzCHI 2011), Sydney
69. Kocaballi, A.B., Gemeinboeck, P., **Saunders, R.** and Dong, A. (2011) ***Towards a Relational Approach to Design Process*** in Proc. 45th Conference of the Architectural Science Association, ANZAScA 2011, Sydney
70. Kocaballi, A.B., Gemeinboeck, P., **Saunders, R.**, Dong, A. and Loke, L. (2011) ***Embracing Relational Agency in Design Process of Machine-Mediated Performances***, SEAM 2011, Sydney
71. Grace, K., **Saunders, R.** and Gero, J.S., (2011) ***Applying Interpretation-Driven Association to Design Domains*** in Proc. CAADRIA 2011, Hong Kong, 453–462
72. Kelly, N., Gero, J.S. and **Saunders, R.** (2011) ***Constructive Interpretation with Examples from Floor Plans*** in Proc. CAADRIA 2011, Hong Kong, 633–642
73. Pourmohamadi, M., **Saunders, R.** and Gero J. S. (2011) ***CAD Software as Customisation Tools: Using FBS Coding Scheme to Understand the Behaviour of Mass Customisers***, Proc. CAADRIA 2011, Hong Kong, 399–408
74. **Saunders, R.** (2011) ***Artificial Creative Systems and the Evolution of Language***, Proc. 2nd Int. Conf. on Computational Creativity, 27–29 April 2011, Mexico City, Mexico, 36–41
75. Grace, K., **Saunders, R.** and Gero, J. S., (2011) ***Interpretation-Driven Visual Association***, Proc. of the Second International Conference on Computational Creativity, Mexico City, 132–134.
76. Gemeinboeck, P. and **Saunders, R.** (2011) ***Zwischenräume: The Machine as Voyeur***, Proc. 1st Int. Conf. on Transdisciplinary Imaging at the Intersections between Art, Science and Culture (TIC 2010), Sydney, 62–70.
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84. **Saunders, R.** (2009) ***Supporting Creativity Using Curious Agents***, Computational Creativity Support workshop, CHI 2009, 4 April, 2009, Boston, MA
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86. **Saunders, R.** and Grace, K. (2008) ***Towards a Computational Model of Creative Cultures***, AAAI Spring Symposium on Creative Intelligent Systems, Stanford University
87. Maher, M.L., Merrick, K. and **Saunders, R.** (2008) ***Achieving Creative Behaviour Using Curious Learning Agents***, AAAI Spring Symposium on Creative Intelligent Systems, Stanford University
88. Gero, J.S., Grace, K. and **Saunders, R.** (2008) ***Computational Analogy Making in Designing: A Process Architecture***, in Proc. CAADRIA 2008, Pimniyom Press, Chiang Mai, Thailand, 153-160
89. Grace, K., **Saunders, R.** and Gero, J.S. (2008) ***A Computational Model for Constructing Novel Associations***, Proc. Int. Joint Workshop on Computational Creativity, Universidad Complutense de Madrid
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Exhibition Catalogues

107. Gemeinboeck, P. and **Saunders, R.** (2015) ***Accomplice*** in F. Di'an and Z. Ga (eds) thingworld: International Triennial of New Media Art, published by NAMOC and The Liverpool University Press, distributed by Oxford University Press
108. Gemeinboeck, P. and **Saunders, R.** (2011) ***Urban Fiction 2.0*** in Love Lace, Powerhouse Museum, Sydney

Research Projects

Dr Saunders' previous research has developed computational models of curiosity for creative design, multi-agent models of social creativity and curious design assistants for design space exploration. His current research projects and future research plans build on this foundation.

Current Research Projects

Current research projects include 'The Performative Body-Mapping (PBM) Method for Socialising Non-humanlike Robots' (ARC DP160104706), the EU-funded Games Research Opportunity (GRO) project to democratise casual game design through the application of computational creativity, and the development of computational models of the evolution of language in creative societies.

Creative Robotics: The Performative Body-Mapping (PBM) method develops a novel approach to designing social, non-humanlike robots, which tackles the 'correspondence problem' in demonstration learning by harnessing dancers' movement expertise and taking advantage of their ability to embody unfamiliar forms. Motion capture of performers inhabiting costumes that resemble robots provides the necessary data to bootstrap a machine learning process, allowing non-humanlike robots to learn how to move in ways that are readable to humans [6, 33, 40, 47, 48, 54]. Current research is exploring the

combination of movement models learned using PBM with intrinsically motivated machine learning to support the improvisation of human readable movements [33], expanding the expressive range of non-anthropomorphic social robots.

Embodied Computational Creativity and Smart Manufacturing: The development of robotics artworks, *Zwischenraume*, *Complicit* and *Accomplice* has provided a test-bed for developing new approaches to embodied computational creativity that change their environment through action [53, 55, 66, 75]. Laboratory-based user experience studies have explored the dynamics between groups of embodied creative agents and human participants [56, 78]. Current research is exploring the acquisition of embodied 'craft-like' skills by robotic systems for the development of grounded models in mark-making processes. Applying computational models of intrinsic motivation and active learning of creative techniques in manufacturing robots will open up new possibilities for smart manufacturing in terms of the materials and techniques available. Early explorations of this have explored the development of suitable hardware and software [8, 9, 53] and possible application to stone masonry [49, 50].

Computational Creativity and Mixed Reality for Game Design: The democratisation of casual game design through the application of computational creativity has resulted in the development of automated game design and testing systems that can be run on mobile devices, permitting the rapid design of new casual games without the need for programming experience [18, 34, 36–39, 41–45]. Current research involves the application of deep learning methods for style transfer for game assets, e.g., 2D character sprites, the combination of deep learning and Monte Carlo Tree Search for believable player modelling in card games, and data mining systems to support design of Procedural Content Generation based games. In addition to applying creative AI techniques to the design of games, I have been involved in the exploration of new game design environments, including the development of multi-player mixed reality systems, designed for museums. This research explores the use of physical and virtual interfaces to build a shared and immersive environment [36].

Computational Models of Distributed Creative Systems and the Evolution of Language: In collaboration with researchers at Helsinki University, Dr Saunders is developing large-scale multi-agent systems to model artificial creative societies, incorporating 50,000+ individuals. This research will support the computational simulation of cultural evolution and the development of novel support environments for online and distributed creative design communities. The computational modelling of the evolution of language in creative societies using a distributed multi-agent system approach has opened up new possibilities for exploring features of natural language that support creativity [42, 52] and the evolution of creative domains [5, 14, 20, 25, 73]. Computational explorations of language as an active component in the creative process have demonstrated the possibility for developing new computational models of 'specific curiosity' that are closer to our common-sense notions of what it means to be curious [4] using vector-space representations of words (e.g. word2vec, GloVe).

Practice-based Research

Dr Saunders has a longstanding track record of practice-based research through high-calibre artistic collaborations that provide insights into the nature of creative processes. Since 2007, Dr Saunders has collaborated with Dr Petra Gemeinboeck on a series of works (Urban Fictions, 2007-8; Zwischenräume, 2009-11; Urban Fictions 2.0, 2012; Accomplice, 2012–present, Machine Movement Lab, 2015–present). Previously, Dr Saunders collaborated with James Coupe and Juan Pampin on Difference Engine; James Coupe and Hedley Roberts on 9PIN++; and, Prof. Jane Prophet, Prof. Mark d'Inverno, Dr Neil Theise and Peter Ride on CELL.

Artworks and Exhibitions

The outputs of collaborations with artists have been exhibited internationally in premier arts venues including the National Art Museum of China (NAMOC), Beijing, the Queensland Art Gallery of Modern Art (QAGOMA), Brisbane, Foundation for Art and Creative Technology (FACT), Liverpool, Powerhouse Museum, Sydney, and Ars Electronica Centre (AEC), Linz.

Machine Movement Lab (2015–present) with Petra Gemeinboeck. Machine Movement Lab presents a collaboration with choreographers and dancers to investigate the micro-ecologies of social robots making connections with other bodies and the world. Exhibited in 2017 at *The Big Anxiety Festival*, Sydney and in 2018 at the *Games and {Performing} Arts Festival*, Cornwall.

Accomplice (2013–present) with Petra Gemeinboeck. Accomplice nestles a social group of curious robots into the fabric of our everyday lives: chipping, knocking and punching their way through walls as they explore their world communicating their findings to each other. Exhibited in 2013 at Artspace, Sydney, and in 2014 at the *Foundation for Art and Creative Technology* (FACT), Liverpool and the *National Art Museum of China* (NAMOC), Beijing. Exhibited from May–September 2018 as part of the exhibition "…and the things we do" at *Azkuna Zentroa*, Bilbao as part of the Prototipoak Bienalle.

Zwischenräume (2010–2012) with Petra Gemeinboeck. Zwischenräume embeds a group of autonomous robots into the walls of a gallery to materialise the stealthy invasion of our everyday environments by digital surveillance. Exhibited in 2010 at *MuseumsQuartier*, Vienna, in 2011 at *Forum Stadtpark*, Graz and in 2012 at *GOMA*, Brisbane as part of the National New Media Art Awards 2012.

Complicit (2011) with Petra Gemeinboeck and Liz Williams. Complicit combines autonomous robotic agents and traditional weaving techniques to explore our complicit relationship with machines through our shared environment. Exhibited in 2011 at the *Underbelly Arts Festival*, Cockatoo Island, Sydney.

Urban Fiction 2.0 (2011) with Petra Gemeinboeck. Urban Fiction 2.0 weaves a virtual fabric spanning Sydney by monitoring GPS-enabled phones and social networks to capture our physical and virtual encounters. Exhibited in 2011 as part of the *Love Lace Exhibition* at the Powerhouse Museum, Sydney.

On Track (2009) with Linda Dement, Petra Gemeinboeck, PRINZGAU/podgorschek, and Marion Traenkle. A performative assemblage involving a mechanical mop, a troupe of robotic brushes and spilling viscous fluids develops an ironic lens examining human endeavour and its overly complicated mechanisms. Exhibited in 2009 at *Rondostucki Gallery*, Katowice, Poland and *Thessaloniki State Museum of Contemporary Art*, Greece.

Urban Fiction (2007) with Petra Gemeinboeck. Urban Fiction uses customised mobile phones to trace participants' movements and encounters, weaving a filigree of imaginary spaces spun by our everyday lives. Exhibited in 2007 at *Tin Sheds Gallery*, Sydney (solo-show).

The Difference Engine (2005) with James Coupe and Juan Pampin. The Difference Engine consists of four autonomous AI systems analyse emails for evidence of divine interventions, harmoniously evangelising their search in the gallery. Exhibited in 2005 at *The Stills Gallery*, Edinburgh.

9PIN++ (2005) with James Coupe, Hedley Roberts and James Wallbank. 9PIN++ uses Artificial Intelligence to predict what will happen in each of nine galleries in an attempt to produce an autonomous system aesthetic. Exhibited in 2005 at *Artsway*, Sway (SCAN network).

Staining Space (2004) with Jane Prophet, Mark d'Inverno and Neil Theise. Staining Space was one of several outcomes that arose from Cell, a collaborative project investigating stem cell research. Exhibited in 2004: *Arnolfini* at L Shed, Bristol; *Magna*, Rotherham; *Cornerhouse Gallery*, Manchester.

Research Supervision

Dr Saunders has a track record of attracting high quality research candidates and has supervised to completion 9 PhD, 1 MPhil and 7 Honours students.

Sarah Levinski (PhD Candidate) is investigating methods to augment choreographic agency for novice dancers.

Anhong Zhang (PhD) explored the evolution of languages for design in artificial creative systems.

Crighton Nichols (PhD) investigated design in first Australian communities using a design capabilities approach.

A. Baki Kocaballi (PhD) developed a framework for 'seamful' interactions for wearable devices.

Morteza Pourmohamadi (PhD) explored the nature of designing in mass customisation systems.

Kazjon Grace (PhD) developed a computational model of situated analogy–making based on conceptual spaces.

Nick Kelly (PhD) developed a computational model of situated interpretation and concept formation in design.

Kathryn Merrick (PhD) developed a computational model of intrinsically motivated reinforcement learning.

Xiong Wang (PhD) studied the affective content of language in collaborative design communication.

Vishal Singh (PhD) developed a computational model of design teams.

Steven Janssen (MPhil) developed a conceptual framework for robotic construction in architecture.

David Bartolo (Graduate Honours) explored augmented reality for engaging stakeholders in urban planning.

Adrian Lombard (Graduate Honours) developed a computational model of the properties of "interesting" sounds.

Dan Bourke (Graduate Honours) developed computational models of the emergence of fashion cycles.

Adam Younis (Undergraduate Honours) designed mixed code editors of the online learning environment, Peep.

Emma Chee (Undergraduate Honours) studied UX for multiple creative robots, Curious Whispers 2.0 [45].

James Hiscock (Undergraduate Honours) developed an on-line learning environment for Processing, Peep.

Leon Spencer (Undergraduate Honours) developed a multi-agent simulation for generative story-telling.

Teaching

Dr Saunders is currently employed in a research-only capacity. Dr Saunders prior track record demonstrates his passion for teaching and his experience of teaching both lecture-based and studio-based classes. Dr Saunders has brought his research into the classroom, for example, in the Human Computer Experience Studio (DECO3200), he challenged his students to develop user interfaces for a robotic bartender [8], later demonstrated at the ROB|ARCH 2016 conference [3]. Dr Saunders' dedication to innovating in his teaching is exemplified by his development of a

social online learning environment, Peep, for teaching Design Programming (DECO1012) [10, 19]. As Associate Dean of Learning and Teaching he played a significant role in shaping research-enriched educational practices in the Faculty of Architecture, Design and Planning.

Selected Classes

The following is a selection of the classes that Dr Saunders has coordinated and/or taught into:

Human Computer Experience Studio (DECO3200), Sydney University, 2014–2015
Design Programming (DECO2011, DECO1012), Sydney University, 2006–2015
3D Modelling (DECO1008 & DECO2103), Sydney University, 2014–2015
Principles of Animation (DECO3006), Sydney University, 2014–2015
Creative Robotics Studio (IDEA9201 & IDEA9202), Sydney University, 2013
Designing Social Media (DECO2010), Sydney University, 2013
Virtual Worlds Studio (IDEA9103 & IDEA9104), Sydney University, 2012
Realtime Multimedia (DECO2606), Sydney University, 2011–2012
Device Studio (IDEA9201 & IDEA9202), Sydney University, 2011
Installation Studio (IDEA9101 & IDEA9102), Sydney University, 2009
Introduction to Game Design (SOMA3622 & SOMA9210), University of NSW, 2009
Experimenting with Game Interfaces (DECO3200), Sydney University, 2008
Interactive Multimedia Design (DECO2102), Sydney University, 2008
Generative Design Systems (DECO2013), Sydney University, 2006–2008
Creative Systems (DESC9176), Sydney University, 2006–2008
Modelling and Animation for Games (DESC9188), Sydney University, 2007
Interaction Design Studio (DECO1200), Sydney University, 2006–2007
Computer Programming for Media Arts, South Bank University, London, 2005
Creative Artificial Intelligence Systems, Sussex University, Brighton, 2005
Computer Science and Games Technology, City University, London 2004–2005
Networks and Operating Systems, City University, London, 2003
System Architecture, City University, London, 2003
Introduction to Computer Programming, Greenwich University, London, 2002

Public Engagement

Dr Saunders has engaged the public in the outcomes of his research through a number of channels including public speaking opportunities, on-line public engagement, collaborations with artists and exhibitions of artworks, engaging with the press, and commercialisation through business ventures.

Public Speaking

Dr Saunders has been invited to speak in public on a range of topics including computational creativity, artificial intelligence, design computing and creative robotics.

I'll Be Back, Twitter, London, 2017
The Friday Club, We Are Social, London, 2017
Public Exhibition, ROB|ARCH 2016, Sydney, 2016
Open Playground, FACT, Liverpool, UK, 2014
Artist Talk, Central Academy of Fine Art, Beijing, 2014
Thursday Night Lecture, Sydney University, 2014
Research Talk, Creative Robotics Lab, UNSW, Sydney, 2013
Invited Lecture, Computational Creativity Autumn School, Helsinki University, 2013
Artist Talk, Ars Electronica Future Lab, Linz, 2012
Artist Talk, Interface Cultures, University of Art and Design, Linz, 2012
Artist Panel, **National New Media Art Awards**, GOMA, Melbourne, 2012
Open Studio, **Underbelly Arts Festival**, Cockatoo Island, Sydney, 2011
Invited Workshop, University for Applied Arts, Vienna, 2010
Artist Talk, University for Applied Arts, Vienna, 2010
Darwin Symposium, Shrewsbury, 2007

Online Public Engagement

Dr Saunders has developed websites to engage the public in research projects as part of his efforts in public outreach and to support his efforts in research-enriched learning.

Evol (2001–2004) was a public website used to gather data about user interactions when engaging with a curious design assistant, revealing that interacting with a curious design assistant provided a natural means of exploring a design space. Preliminary data from this research was used to support the argument for future work in this area [2] and later at a CHI workshop on creativity support [74].

Peep (2009–2016) is a public website for learning the fundamentals of design programming using the Processing programming language. It has been used to teach of Design Programming at Sydney University [10] but members of the public were encouraged to register to make use of the tutorials and provide feedback on the website and learning material, which supported its further development.

Press Coverage

Dr Saunders has experience of working with the press and has given interviews to local radio stations (2SER, 8 Dec 2014), podcasts (Robots Podcast #121, 2013), magazines (Realtime TV, 2013; Gizmag, April 2014) and high-profile web sites (We Make Money Not Art, April 2014). In addition, his work has been reviewed in the press, including:

Artlink Vol. 32, No. 1 (Australia, January 2012)

EL PAIS (Spain, 31 May 2012)

the art life (Australia, May 2013)

The Brag No. 511 (may 2013)

The Guardian (Australia, 11 June 2013)

RealTime Arts Magazine ISEA 2013 (Australia, 11 June 2013)

Artlink Vol. 33, No. 3 (September 2013)

mediatelecom (Mexico, April 2014)

TUSK Journal (UK, April 2014)

The Double Negative (UK, April 2014)

Artforum International Vol. 53, No. 3 (November 2014)

Commercialisation of Research

Dr Saunders has commercialised his research through consulting and the establishment of companies. He has applied his research in generative design to the development of commercial design systems, including an automated logo design system for Tribal DDB, one of the top advertising firms in the UK. Dr Saunders co-founded Jenkins and Saunders, LLP in 2005 developing interactive flight maps, still used by airports and airlines around the world[1]. In this innovative software, he develop a unique the intelligent layout system for the display of routes. In 2009, the company was sold to Innovata LLC for approx. £500,000. In 2016, Dr Saunders co-founded MetaMakers Ltd with Prof. Simon Colton to commercialise computational creativity research with a focus on the commercialisation of Gamika Technology for casual game design.

[1] One installation of the interactive flight map system developed by Jenkins and Saunders, LLP can be found on One World's website at http://www.oneworld.com/flights/where-we-fly