

NIGEL CROOK

Date of Birth: 24th February 1964 Nationality: British ncrook@brookes.ac.uk
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Current Employer

2017 **Oxford Brookes University**, Gipsy Lane, Headington, Oxford OX3 0BP
to
2018 **Job Title:** Interim Associate Dean Research and Knowledge Exchange

Main Activities

Contributed to the development, implementation and monitoring of the Faculty's Research and Knowledge Exchange operation plans.

Active member of the inter-Faculty group of Associate Deans (R&KE) and of the TDE Exec Group.

Chaired Faculty Research and Knowledge Exchange, Research Degrees sub-committee and the REF Strategy Committee.

Led preparations in the Faculty for the REF, including workshops on developing impact case studies and forming REF Audit reading panels. Developed the REF Audit spreadsheet for the University.

Managed the QR Budgets across the Faculty. Managed the grant approval's process within the Faculty.

Led on networking, the formation of research and knowledge exchange partnerships and public engagement. Engaged in personal research activities in biologically inspired machine learning and ethical AI/robots.

Employment History

2016 **Oxford Brookes University**, Wheatley Campus, Wheatley, Oxford, OX33 1HX
to
2017 **Job Title:** Interim Head of Mechanical Engineering and Mathematical Sciences

Main Activities

Manage a department of 31 academics, ~20 research students/staff and ~550 UG and PG students

- Introduce distributed leadership and a joint senior management group with CCT
- Update the Subject Coordinator role
- Introduce revised WLP system
- Successful delivery of all UG and PG programmes
- Significantly increase successful research grant applications (Achieved. Eg. DYNAMO Project with Ford, Total grant £22m, £1,071m to Oxford Brookes.)

2011 **Oxford Brookes University**, Wheatley Campus, Wheatley, Oxford, OX33 1HX
to
2017 **Job Title:** Head of Computing and Communication Technologies

Main Activities

Manage a department of 22 academics, ~20 research students/staff and ~450 UG and PG students

- Significantly improve department's research assessment return in REF2014 (achieved, 24% power increase, 33% increase in 4-star score, 11% increase in 3-star score)
- Significantly increase successful research grant applications (Achieved. E.g. H2020 PEPPER Total Grant €3,887,185, of which Brookes received €526,100. H2020 SARAS Project, Total Grant €4,315,640, of which Brookes will receive €596,073).
- Substantially improve the student experience (achieved, NSS satisfaction up from 64% to 87%)
- Substantially revise and revalidate 7 UG and 4 PG Computing Courses (achieved)
- Create programmes in new areas: BSc Computing for Robotic Systems (achieved), MSc Computer Vision (achieved), MSc System Admin & IT Management (achieved).
- Secure BCS accreditation for all revalidated courses (achieved)
- Successful delivery of all UG and PG programmes

Research:

- Research projects in human-robot interaction, social robotics and biologically inspired machine learning.
- Launch new Cognitive Robotics Lab at Brookes (achieved)
- Secured funding for research
 - £182,670 EPSRC and Innovate UK funding

- £64,000 competitively awarded University funding of research projects
- £130,000 University funding to build and equip new Robotics Laboratory
- €1.2M PI for 2 EU Funded projects transferred from Open University
- Produce high quality research outputs (achieved for REF2014)
- Supervision of PhD students in robotics

Teaching: UG and PG computer science courses and final year projects (including Robotics and Machine learning).

2008 to 2011 **Oxford University Computing Laboratory**, Wolfson Building, Parks Road, OXFORD,

Job Title: Postdoctoral Research Assistant

Main Activities

Research:

- Machine learning: non-parametric Bayesian models (Dirichlet Processes) for unsupervised clustering.
- Computational linguistics: Development of an Embodied Conversational Agent (ECA)
- Generating natural language descriptions of the content of images (Google funded)

Teaching

- Classes & marking for Computational Linguistics course
- Information Retrieval (Masters level): 20 lectures & examination

Management/Administration:

- Supervision of Postdoctoral research staff.
- PhD student supervision (Computer Vision, Oxford Brookes University)

External examiner for M366 Natural and Artificial Intelligence, Open University (2007 – 2011)

1985 to 2008 **Department of Computing and Electronics, Oxford Brookes University**

Job Titles: Reader in Computing (2003 -2008)
Principal Lecturer in Computing (1997-2003)
Senior Lecturer in Knowledge Engineering (1992-1997)
Lecturer in Knowledge Engineering (1988 – 1992)
Research/Teaching Assistant (1985 – 1988)

Academic Achievements

- 2007 - 2009 University of Oxford, Department for Continuing Education
Diploma in Biblical and Theological Studies (part-time), awarded with Distinction
- 1985 - 1991 Oxford Polytechnic (CNAA)
PhD in Computer Science: *The Theory of Explanation Applied to Medical Expert Systems*.
- 1988 - 1989 Oxford Polytechnic
Certificate in Curriculum Development
- 1982 – 1985 University of Lancaster
BSc (Hons) in Computing and Philosophy, Upper Second Class

Funding

- 2015 EU H2020: €2,753,143 – *WEKIT – Wearable Experience for Knowledge Intensive Training*. 13 Partners including Oxford Brookes University (PI: N.T. Crook, Co-I: F. Wild – **transferred from OU. Awarded 2015.**
- 2015 EU H2020: €7,741,701 - *TCBL – Textile & Clothing Business Labs*. 17 Partners, including Oxford Brookes University (PI: N.T. Crook, Co-I: F. Wild – **transferred from OU. Awarded 2015.**
- 2015 Innovate UK (TSB) KTP: £160,000 (inc. £96,000 grant) – *Meta Vision Systems KTP: application of computer vision robotic welds*,. Lead Academic: N.T. Crook, Academic Supervisor: F. Cuzzolin, Company: Meta Vision Systems. **Awarded March 2015.**
- 2014 Competitively awarded funding from Oxford Brookes Central Research Funding totalling £16,000. PI: N.T. Crook. **Awarded**
- 2012 Competitively awarded funding from Oxford Brookes Central Research Funding totalling £47,600. PI: N.T. Crook. **Awarded**
- 2011 EPSRC (Pump-Priming Vision & Language Research): £1,950. PI: N. Crook. **Awarded**

- 2010 Google Research Award: \$60,000 - *Automatic generation of natural language descriptions of visual scenes*. **Awarded**. PI: S. Pulman, Postdoc: N. Crook (I co-authored this proposal).
- 2006 Royal Society (conference fees, travel & subsistence): £720. **Awarded**.

Consultancy

- 1995 - 1996 NHS Information Management Group: £20,000 - *Standards Selection System*. Systems Analyst: Dr N.T. Crook, Software Engineer: C. Dobbyn.

Research Student Supervision

- Solomon, B. 2015 – present, *A Framework for Modelling Social Media Collaborative Work*
- Sturgess, P. 2014 – 2016, *Holistic Street Scene Understanding as a Higher Order Labelling Problem with Associative Hierarchical Random Fields*, **PhD awarded 2016**.
- Singh, G. 2015 – present, *Continuous human action detection and future action prediction*.
- Saha, S. 2014 – present, *Online Multiple Human Action Detection from Videos* **Submitted Jan 2018**
- Lee, M. 2014 – present, *3D action recognition in a real-time online environment, transferred to University of Oxford*
- Lidegaard, M. 2013-2014, *Computer Vision and Natural Language to Help the Partially Sighted*, transferred to University of Oxford.
- Barker, S. 2011-present (part-time), *Design, build and experimentation with a humanoid head and neck robot*. **PhD awarded 2017**.
- Sheasby, G. 2009-2013, *Beyond Controllers: Object Detection and Human Pose Estimation as Game Input Mechanisms*, **PhD awarded 2013**
- Rihan, J. 2006–2011, *Computer Vision for Computer Games*, **PhD awarded 2011**
- Goh, W.J. 2003–2008, *Some Computational properties of Chaotic Neural Networks*, **PhD awarded 2008**.
- Howarat, M., 2001–2007, *Adaptive Chaotic Neural Networks*, **PhD awarded 2007**.
- Tator, S., 1998 - 2001, *Supporting Adaptive Continuous Media over Packet Switched Networks*, **PhD awarded 2002**.
- olde Scheper, T. 1997–2000, *Chaos and information in Dynamic Neural Networks*, **PhD awarded 2002**.
- Howes, P. 1995 - 1999, *Automated Explanation Facilities for Neural Networks*, **PhD awarded 1999**.
- McQuoid, M.R.J., 1992-1995, *A Neural Architecture for Emergent Serial Behaviour*, **PhD awarded 1996**.
- Howes, P. 1990-1993, *The Application of Expert Systems to Forecasting with Time Series Data*, **MPhil awarded 1993**.

Research Degree Examinations

- Vineet, V. 2014, Oxford Brookes University. *Recognition, Reorganisation, Reconstruction and Reinteraction for Scene Understanding*, PhD.
- Sengupta, S. 2014, Oxford Brookes University. *Semantic Mapping of Road Scenes*, PhD.
- Hare, S. 2012, Oxford Brookes University. *Online Structure Learning for Real-Time Computer Vision Gaming Applications*, PhD.
- Lafon, T. 2012, Oxford Brookes University. *Biotic Pump of Atmospheric Moisture: A Conceptual Model*. MPhil.
- Rust, A. 2011, University of Oxford, *Improvements to Suffix Tree Clustering and Test Collections for Relevance Analysis*, MSc by research.

Involvement in International Research Community

Reviewer for: IEEE Transactions on Neural Networks, IEEE Transactions on Signal Processing, IEEE Transactions on Robotics, Neurocomputing, Image and Vision Computing, Fuzzy Sets and Systems, Transactions of the IEICE, Transactions on Circuits and Systems: Part –I (TCAS-I), Chaos, Solitons & Fractals, Expert Systems, PLOS ONE.

EPSRC Associate College member.

Scientific committees: ICTAI (IEEE International Conference on Tools with Artificial Intelligence) 2013-present, ICSR (International Conference on Social Robotics) 2015, ICMLA (International Conference on Machine Learning and Applications) 2010-present, ESANN conference (European Symposium on Artificial Neural Networks) 2007 – present, ISA2007 (the IADIS International Conference on Intelligent Systems and Agents). International Conference on Neural Networks, Workshop on Language, Action and Perception (2011 - present), ROMAN 2016 Workshop on Evaluation Methods Standardization in HRI.

European Commission: Expert Reviewer for FET projects APEREST, SENSEMAKER, SpikeFORCE, NEUROBIT, CIRCE, and Integrated Projects DAISY, FACETS and SECO. Also reviewer for the FP5 project ALAVLSI and the Neuro-IT network. Vice Chair and Expert Evaluator of STREP and Integrated Project proposals for FP7, FET Flagship projects and H2020-ICT.

Editorial boards: International Journal of Computational Intelligence (2003-2005). International Journal of Soft Computing (2007- 2008).

Editor: Guest Editor for BioSystems Journal for IPCAT2007. Guest Editor of BeJLT Brookes eJournal of Learning and Teaching, 2015.

Workshop chair: 7th International Workshop on Information Processing in Cells and Tissues, August 2008, Jesus College, Oxford.

Recent invited talks: *Robots of Good Character*, AI & Robotics The Main Event, 24th September 2017. *My Boss is a Robot: Latest Thinking and Possible Futures for Human-Robot Collaboration*, Unipart leadership conference, 3rd November 2016, *Actuation for the biomimetic control of social robots*, IMechE Smart Actuation conference, Rolls Royce, Derby 1st October 2014. *Generating context-sensitive ECA responses to user barge-in interruptions* Abberystwyth, 12th August 2013. *How to pursue digital research ideas*, Bridging the Digital Research Divide, St John's College, University of Oxford, 21st March 2014.

Media appearances

BBC Radio Oxford 9th February 2018 – David Prever show – Comments on Autonomous moral vehicles
Premier Radio – 23rd January 2018 - Video interview for Unbelievable program – to be made public in May 2018
BBC South Today – 24th January 2017 – with Stephen Metcalfe MP (chair Commons Science & Tech com) visit
BBC World News – 14th September 2015 – Cognitive robotics research
BBC World News, Global programme – 6th November 2014 – Realistic humanoid robots and computer graphics
BBC Radio Oxford – 24th June 2014 – Robot Sumo Competition
BBC Radio Oxford – 27th June 2014 – Robot Sumo Competition
BBC South Today – 27th June 2014 – Robot Sumo Competition
CNBC Squawk Box – 1st May 2014 – RoboThespian the Humanoid Robot
BBC South Today – 14th March 2014 – Artie at the Ashmolean Museum, Oxford
ITV Meridian News – 13th March 2014 - Artie the talking robot delights students at Oxford Brookes University
BBC Radio Oxford – 12th March 2014 – Artie the humanoid robot
BBC Breakfast – 10th March 2014 – RoboThespian joins BBC Breakfast
CBBC Newsround – 10th March 2014 – Newsround chats with robot expert

Research Interests

My research interests include human-robot interaction, social robotics, embodied conversational agents and biologically inspired machine learning. I am particularly interested in ethical AI and developing robots with moral competence.

Membership of Professional Bodies

IEEE member
IEEE Robotics and Automation Society Member
IEEE Internet of Things Community
British Computer Society member
I am a Principal Fellow of the Higher Education Academy

Referees

Paul Inman (line manager), Pro Vice-Chancellor, Dean of the Faculty of Technology, Design and Environment, Oxford Brookes University, Headington Campus, Gypsy Lane, Oxford OX3 0BP. Tel: 01865 483350. Email: p.inman@brookes.ac.uk

Prof. Stephen Pulman FBA,
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sgpulman@gmail.com

Prof. Dr. Jochen Steil, Technische Universität Braunschweig
Institut für Robotik and Prozessinformatik, Mühlentorstr. 23 D-38106 Braunschweig, Germany
jsteil@rob.cs.tu-bs.de

Refereed Journal Publications:

Crook, N. (2015) Communicating Computer Science – Lessons from recent history. **BeJLT** (Brookes eJournal on Learning and Teaching) **7(1)**, July 2015.

Aldea, A., Crook, N., Duce, D., Marshall, P. and Martin, C. (2015) David Sutton Reflections on the Evolution of Teaching Programming to Undergraduates at Oxford Brookes University. **BeJLT** (Brookes eJournal on Learning and Teaching), **7(1)**. July 2015.

Cheng, M., Zheng, S., Lin, W., Vineet, V., Sturgess, P., Crook, N., Mitra, N. and Torr, P. (2014) ImageSpirit: Verbal Guided Image Parsing. **ACM Transactions on Graphics**, 2014.

M Alhwarat, Olde T Scheper and N T Crook. (2014) Investigation of a Chaotic Spiking Neuron Model. **International Journal of Computer Applications** 99(17):1-8.

Crook, N.T., Smith, C., Field, D., Cavazza, M., Pulman, S., Moore, R., and Boye, J. (2012) Generating context-sensitive ECA responses to user barge-in interruptions. **Journal of Multimodal User Interfaces**, 6 (1), 13-25.

Smith, C., Crook, N.T., Boye, J., Charlton, D., Pizzi, D., Cavazza, M. and Pulman, S. (2011) Interaction Strategies for an Affective Conversational Agent. **Presence**, October 2011, Vol. 20, No 5, 395-411.

Crook, N.T. and Goh, W.J (2008) Nonlinear transient computation as a potential “kernel trick” in cortical processing. **BioSystems** **94**(1), 55-59.

Crook, N.T. 2007. Nonlinear transient computation. **Neurocomputing**. 70, 7-9 (Mar. 2007), 1167-1176. DOI= <http://dx.doi.org/10.1016/j.neucom.2006.10.148>

Crook, N.T., Goh, W.J. and Hawarat, M. (2007) Pattern Recall in Networks of Chaotic Neurons. **BioSystems**, 87, 267-274.

Crook, N.T., olde Scheper, T. & Pathirana, V. (2003) Self-organised dynamic recognition states for chaotic neural networks. **Information Sciences** **150** (1-2), 59 – 75.

Crook, N.T. & olde Scheper, T. (2002) Adaptation Based on Memory Dynamics in a Chaotic Neural Network. **Cybernetics and Systems** **33** (4), 341-378.

Howes, P. and Crook, N.T. (1999) Using Input Parameter Influences to Support the Decisions of Feedforward Neural Networks. **Neurocomputing** 24, 191-206.

Crook, N.T. and J.L. Nealon (1986) Towards Convincing Explanations in Medical Expert Systems, **Biomedical Measurement Informatics and Control**, **1** (4).

Book Chapters

Beton, L., Hughes, P., Barker, S., Pilling, M., Fuente, L. and Crook, N. (2017) Leader-Follower Strategies for Robot-Human Collaboration. **In: Maria Isabel Aldinhas Ferreira et al (eds) A World with Robots**, Springer. Chapter DOI: 10.1007/978-3-319-46667-5_11

Sheasby, G., Valentin, J., Crook, N. and Torr, P. (2012) Robust stereo priors for human segmentation. Submitted to the 11th Asian Conference on Computer Vision (ACCV2012), Part II, LNCS 7725, pp 94-107, Springer-Verlag

Crook, N.T. & olde Scheper, T. (2001) Dynamic Recognition States for Chaotic Neural Networks. **In: John, R. & Birkenhead, R. (eds) Advances in Soft Computing: Developments in Soft Computing**. Physica-Verlag, 62-72.

Crook, N.T., Dobbyn, C. and olde Scheper, T. (2000) Chaos as a Desirable Stable State of Artificial Neural Networks. **In: John, R. & Birkenhead, R. (eds) Advances in Soft Computing: Soft Computing Techniques and Applications**. Physica-Verlag, 52-60.

Refereed Conference Papers

Barker, S., Izadi, H., Crook, N.T., Hayatleh, K., Rolf, M., Hughes, P. and Fellows, N. (2017) Natural head movement for HRI with a muscular-skeletal head and neck robot. In proc IEEE RO-MAN2017, August 28 - September 1, 2017, Lisbon.

Rolf, M and Crook, N. (2016) What if: robots create novel goals? Ethics based on social value systems. **In: Proc of Workshop on Ethics in the Design of Intelligent Agents (EDIA16)**, The Hague,

Holland. 30th August 2016.

Barker, S., Fuente, L.A., Haytleh, K., Fellows, N., Steil, J. and Crook, N.T. (2015) Design of a Biologically Inspired Humanoid Neck. **In:** Proceedings of the IEEE International Conference on Robotics and Biomimetics (ROBIO 2015).

Breton, L., Hughes, P., Barker, S., Pilling, M., Fuente L. and Crook, N.T. (2015) The Impact of Leader-Follower Robot Collaboration Strategies on Perceived Safety and Intelligence. **In:** Proceedings of the International Conference on Robot Ethics, Lisbon, 23rd-24th October 2015.

Fuente, L.A., Lones, M.A., Crook, N.T. and Olde Scheper, T. (2015) Harmonic versus Chaos Controlled Oscillators in Hexapedal Locomotion. **In:** 10th International Conference on Information Processing in Cells and Tissues (IPCAT2015), San Diego, USA, 14th-16th September 2015

Fuente, L.A., Pilling, M., Ierardi, H. and Crook, N.T. (2015) Body-pose mirroring during human-robot interaction. **In:** Proceedings of the Seventh International Conference on Social Robotics (ICSR2015), 26th to 30th October 2015, Paris, France.

Crook, N., Barker, S., Honour, A., Pilling, M., Haytleh, K. and Fellows, N. (2013) Accurate robotic replication of human head gestures. **In:** Proc ICSR2013 workshop "Taking Care of Each Other: Synchronisation and Reciprocity for Social Companion Robots".

Cheng, M., Warrell, J., Lin, W., Zheng, S., Vineet, V. and Crook, N. (2013) Efficient salient region detection with soft image abstraction. **In:** Proceedings of IEEE International Conference on Computer Vision (ICCV), Sydney, Australia, December 3-6, 2013, 1529-1536

Lin, W., Cheng, M., Zheng, S., Lu, J. and Crook, N. (2013) Robust Non-parametric Data Fitting for Correspondence Modeling. **In:** Proceedings of IEEE International Conference on Computer Vision (ICCV), Sydney, Australia, December 3-6, 2013, 2376-2383

Sturgess, P., Ladicky, L., Crook, N. and Torr, P. (2012) Scalable Cascade Inference for Semantic Image Segmentation. **In:** Proceedings of the British Machine Vision Conference (BMVC2012), Surrey, 3rd – 7th September, 2012.

Sheasby, G., Warrell, J., Zhang, Y., Crook, N. and Torr, P (2012) Simultaneous Human Segmentation, Depth and Pose Estimation via Dual Decomposition, **In:** Proceedings of the British Machine Vision Conference (BMVC2012), Surrey, 3rd – 7th September, 2012. **Best paper award**

Zhang, Z, Sturgess, P, Sengupta, S, Crook, N and Torr, P (2012) Efficient Discriminative Learning of Parametric Nearest Neighbor Classifiers. **In:** Proceedings of 2012 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Providence, Rhode Island, 16th – 21st June 2012.

Crook, N.T, Pulman, S. and Blunsom, P. (2011) Automatic generation of natural language descriptions of visual scenes. **In:** Proceedings of the 2011 V&L Net Workshop on Vision and Language (VL'11). Brighton, 15th September 2011. **Best poster award**

Hakulinen, J, Turunen, M, Santos de la Camara, S. and Crook, N.T. (2010) Parallel Processing of Interruptions and Feedback in Companions Affective Dialogue System. **In:** Proceedings of Interspeech2010, Makuhari, Japan. 26-30 September 2010.

Cavazza, M., Santos de la Cámara, R., Turunen, M., Gil, J., Hakulinen, J., Crook, N.T. and Field, D. (2010) 'How was your day?' An Affective Companion ECA Prototype. **In:** Proceedings of the 11th Annual SIGDIAL Meeting on Discourse and Dialogue. Tokyo, Japan. 24th – 25th September 2010.

Smith, C., Crook, N.T., Boye, J., Charlton, D., Pizzi, D., Cavazza, M. and Pulman, S. (2010) Interaction Strategies for an Affective Conversational Agent. **In:** Proc. 10th International Conference on Intelligent Virtual Agents (IVA2010), Philadelphia, Pennsylvania, United States. 20th to 22nd September 2010.

Cavazza, M., Smith, C., Charlton, D., Crook, N.T., Boye, J., Pulman, S., Moilanen, K., Pizzi, D., Santos de la Camara, R. and Turunen, M. (2010) Persuasive Dialogue based on a Narrative Theory: an ECA Implementation. **In:** Proceedings of the Fifth International Conference on Persuasive Technology (Persuasive 2010). Copenhagen, Denmark. 7th to 10th June 2010.

Crook, N., Smith, C., Cavazza, M., Pulman, S., Moore, R. and Boye, J. (2010) Handling User Interruptions in an Embodied Conversational Agent. **In:** *Proceedings of the AAMAS International Workshop on Interacting with ECAs as Virtual Characters*, Toronto, Canada 10th May 2010, 27 – 33.

Crook, N.T., Granell, R. and Pulman, S. (2009) Unsupervised Classification of Dialogue Acts using a Dirichlet Process Mixture Model. **In:** Proceedings of SIGDIAL 2009: the 10th Annual Meeting of the Special Interest Group in Discourse and Dialogue, pages 341–348, Queen Mary University of London,

September 2009.

Goh, W.J and Crook, N.T. (2007) Pattern Recognition using Chaotic Transients. **In:** Proceedings of 15th European Symposium on Artificial Neural Networks (ESANN'2006), Bruges, Belgium, April 25-27th, 2007. pp 7-12.

Crook, N.T. and Goh, W.J. (2007) Human Motion Recognition using Nonlinear Transient Computation. **In:** Proceedings of 15th European Symposium on Artificial Neural Networks (ESANN'2007), Bruges, Belgium, April 25-27th, 2007. pp 543-548.

Crook, N.T. and Goh, W.J (2007) Nonlinear transient computation in cortical columns. **In:** Proceedings of 7th International Workshop on Information Processing in Cells and Tissues (IPCAT2007), Oxford, UK, 29th – 31st August 2007. ISBN 978-80-87139-68-4. pp261-267.

Crook, N.T. (2007) Towards Gait Recognition using Nonlinear Transient Computation. **In:** Proceedings of Vision-based Biometrics, BMVA symposium, BCS London, 14th February 2007.

Crook, N.T. (2006) Nonlinear Transient Computation and variable noise tolerance. **In:** Proceedings of 14th European Symposium on Artificial Neural Networks (ESANN'2006), Bruges, Belgium, April 26-28th, 2006.

olde Scheper, T. and Crook, N.T. (2006) Nonlinear dynamics in neural computation. **In:** Proceedings of 14th European Symposium on Artificial Neural Networks (ESANN'2006), Bruges, Belgium, April 26-28th, 2006.

Crook, N.T., Goh, W.J. and Hawarat, M. (2005) The Nonlinear Dynamic State neuron. **In:** Proceedings of 13th European Symposium on Artificial Neural Networks (ESANN'2005), Bruges, Belgium, April 27-29th, 2005.

Crook, N.T., Goh, W.J. and Hawarat (2005), M. Pattern Recall in Networks of Chaotic Neurons. **In:** Proceedings of Sixth International Workshop on Information Processing in Cells and Tissues (IPCAT2005), York, UK, August 30 - September 1, 2005.

Hawarat, M.O., Crook, N.T. and olde Scheper, T. (2004) Adaptation in Chaotic Spiking Neural Networks. **In:** Proceedings of Recent Advances in Soft Computing (RASC2004), Nottingham, 16 -18 December 2004.

Crook, N.T. (2004) A Chaotic Basis for Neural Coding. **In:** Proceedings of the 12th European Symposium on Artificial Neural Networks (ESANN'2004), Bruges, Belgium, 28th – 30th April 2004, 151-156.

Crook, N.T. & olde Scheper, T (2002) An Adaptive Chaotic Neural Network. **In:** Proceedings of the International Joint Conference on Neural Networks (IJCNN'2002), 2002 IEEE World Congress on Computational Intelligence, Honolulu, Hawaii, 12th – 17th May 2002.

Crook, N.T. & olde Scheper, T (2002) Learning in a Chaotic Neural Network. **In:** Proceedings of the Tenth European Symposium on Artificial Neural Networks (ESANN'2002), Bruges, Belgium, 24th – 26th April 2002, 401-406.

olde Scheper, T & Crook, N.T. (2002) Delay Control Aspects of the Chaotic Rossler System. **In:** Proceedings of the Third International NAISO Symposium on the Engineering of Intelligent Systems (EIS'2002) Malaga, Spain, 24th – 27th September 2002.

Crook, N.T. & olde Scheper, T (2002) Adaptive Memory Dynamics in a Chaotic Neural Network. **In:** Proceedings of the Third International NAISO Symposium on the Engineering of Intelligent Systems (EIS'2002) Malaga, Spain, 24th – 27th September 2002.

Crook, N.T. & olde Scheper, T. (2001) Dynamic Pattern Recognition Using a Chaotic Neural Network. **In:** Proceedings of the Fourth International ISCS Symposium on Soft Computing and Intelligent Systems for Industry, Paisley, Scotland, 26th-29th June 2001, 90.

Crook, N.T. & olde Scheper, T. (2001) A Novel Chaotic Neural Network Architecture. **In:** Proceedings of the Ninth European Symposium on Artificial Neural Networks (ESANN'2001), Bruges, Belgium, 25th – 27th April 2001, 295-300.

olde Scheper, T. & Crook, N.T. (2000) Chaos and Information in Artificial Neural Networks. **In:** Proceedings of the World Conference of Nonlinear Analysis, Catania, Italy, 18th – 27th July 2000.

olde Scheper, T. & Crook, N.T. (1998) Chaos as a Desirable Stable State of Artificial Neural Networks. **In:** Proceedings of the ICSC/IFAC Symposium on Neural Computation (NC'98), Vienna 1998.

- Crook, N.T, and Dobbyn, C. (1998) Identifying State Trajectories in Dynamic System. **In:** Proceedings of the Engineering of Intelligent Systems (EIS98) conference (February 1998 Tenerife), 164-170
- Howes, P. and Crook, N.T. (1997) Efficient Rule Extraction from Real-Valued Feedforward Neural Networks. **In:** Proceedings of the Ninth Ireland Conference on Artificial Intelligence (AI-97), University of Ulster, Northern Ireland.
- Dobbyn, C. and Crook, N.T. (1996) Uncertain Standards: The NHS Standards Selection System. **In:** Proceedings of the BCS Annual Conference: Expert Systems 96 (November 1996 Cambridge).
- Howes, P. and Crook, N.T. (1996) Rule Extraction from Neural Networks. **In:** Proceedings of the AISB'96 Workshop "Rule Extraction from Trained Neural Networks", University of Sussex, April 1996.
- Crook, N.T., Dobbyn, C. and Ray, S. (1996) Habituation of the eye stalk withdrawal reflex in the land snail *Helix aspersa*, Presented to the 1996 Annual Conference of the Experimental Analysis of Behaviour Group, University College London, March 1996.
- Crook, N.T. (1994) Explanation in a Dynamic Constraint Satisfaction Problem. **In:** Nealon, J.L. (ed.) BCS SGES Newsletter, Issue No. 30, Summer 1994.
- Crook, N.T. and J.L. Nealon (1987) Towards Convincing Explanations in Medical Expert Systems, **In:** Proceedings of 2nd Workshop on Explanation Alvey KBS Explanation Special Interest Group, University of Surrey, January 1987.
- Crook, N.T. (1987) Representing Variable Necessary and Sufficient Evidences for Hypotheses using Interactive and Dynamic Structure Diagrams, **In:** Proceedings of 3rd Workshop on Explanation Alvey KBS Explanation Special Interest Group, University of Surrey, 29th September - 1st October 1987.