

Personal information

Name Ross Donald King

Nationality British

Education

1985-1988	Ph.D.	Computer Science: Turing Institute.
1984-1985	M.Sc.	Computer Science: University of Newcastle Upon Tyne.
1979-1983	B.Sc. Hons.	Microbiology: University of Aberdeen.

Employment

2020-present	Director of Research, University of Cambridge, UK.
2019-present	Professor of Machine Intelligence, Chalmers University of Technology, Sweden.
2018-present	Fellow, Alan Turing Institute, UK.
2012-2019	Professor of Machine Intelligence, University of Manchester, UK.
2017-2018	Senior visitor, National Institute of Advanced Industrial Science and Technology, Japan.
2002-2012	Professor, Dept. of Computer Science, University of Wales, Aberystwyth, UK.
2000-2002	Reader, Dept. of Computer Science, University of Wales, Aberystwyth, UK.
1996-2000	Lecturer, Dept. of Computer Science, University of Wales, Aberystwyth, UK.
1992-1996	Postdoctoral Fellow, Molecular Modelling Lab, Imperial Cancer Research Fund, UK.
1991-1992	Research Associate, Dept. of Statistics and Modelling Science, University of Strathclyde.
1990-1991	Head of Biotechnology Department, Brainware GmbH, Berlin.
1990-1990	Research Associate, Dept. of Statistics and Modelling Science, University of Strathclyde.
1989-1990	Visiting Professor, Dept. of Maths and Computer Science, University of Denver, USA.

Most Significant Achievements

- I developed the first machine to autonomously discover novel scientific knowledge: the Robot Scientist “Adam”. A Robot Scientist integrates AI with laboratory robotics to automate cycles of scientific research. I have published in both *Nature* and *Science* on this subject. AI is now starting to transform science.
- I developed the first nondeterministic universal Turing machine - using DNA. This new computational paradigm has the potential out-perform all existing electronic computer on NP complete problems.

Research Status

- I have worked in machine learning for over 30 years. Machine learning is now the world’s hottest technology. I published 5 out of the first 30 papers in PubMed on machine learning (now >20,000).
- >140 refereed publications in Computer Science, Biology, and Chemistry. H-index 51.
- Investigator on current grants worth £1,334,000 of grants: EPSRC, & ATI. In the past I have also won large grants from BBSRC, CHIST-ERA, DARPA, Pfizer, EPSRC, MRC, HEFCW, Royal Society/Wolfson, R.A. Eng.
- My group has one of the very few “wet” biology laboratories run in a Computer Science Department anywhere in the World.
- I am currently working on ‘transformative machine learning’ (TML), a novel and general representation for sets of related problems. TML has the dual advantages of improving ML performance, and enabling explainable predictions. The fundamental new idea is to transform a standard (implicit) data representation into an explicit representation based on the predictions of pre-trained models.

Administration of Science

- I served on the *Higher Education Funding Council for England* (HEFCE)'s REF Expert Advisory Group. We advised the UK Government on how best to reform University research funding.
- I served on the 2008 RAE Computer Science Sub-panel. We evaluated and decided relative core funding for all UK Computer Science Depts.
- I was the UK *Biotechnology and Biological Sciences Research Council* (BBSRC) representative on the UK Joint Information Systems Committee’s (JISC) Research sub-committee (JCSR). In this role I initiated the £1.5 million UK National Text Mining Centre.
- I served on the BBSRC’s Engineering and Biological systems committee. I have also served on the BBSRC’s Strategic Research Studentship committee. I am in the EPSRC’s Peer Review College.

Teaching Experience ^[1]_[SEP]

- I have taught Ph.D. students in statistical research methods.
- I have taught undergraduate and M.Sc. course in AI and machine learning.
- I developed and designed the course curriculum of a M.Sc. in Bioinformatics - including the biological and statistical modules. ^[1]_[SEP]
- I have supervised numerous Ph.D. students. My student Amanda Clare's thesis was runner-up in the ^[1]_[SEP]British Computer Society award for best Thesis of the year.

Prizes

- Research named as 4th most significant scientific advance of 2009 by *Time* magazine.
- British Computer Society, Machine Intelligence Prize, 2007.
- World Technology Software Award Nominee: Software 2004, Software 2006.
- Best papers:
 - International Conference on Knowledge Discovery and Data Mining (KDD).
 - European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)

Details of grants awarded

Current Grants

PI Genesis	WASP	€6,000,000
PI Action on Cancer	EPSRC	£884,090
PI Spatial Learning	ATI	£200,000

Significant grants within the last eight years

PI A Robot Chemist	EPSRC	£250,000
PI Big Mechanism	DARPA	£801,784
Co-PI Adalab	CHIST-ERA	£387,992
PI Learning to learn how to design drugs	EPSRC	£252,700
Co-PI Molecular marker-assisted plant breeding on a genome wide scale	BBSRC	£150,000
PI UNICELLSYS	EU	£428,563
PI A Robot Scientist for drug design and chemical genetics	BBSRC	£1,029,579
PI A Robot Scientist for Intelligent Screening	HEFCW	£540,000
PI Computation Biology Centre	HEFCW	£648,000
PI Bio-Logical	BBSRC	£573,883
PI The Modelling Apprentice:	BBSRC	£99,554
PI Giving Adam & Eve Sight	RAEng	£22,000
PI The Robot Scientist as an e-Science Exemplar	BBSRC	£61,531
PI Advanced Scientific Discovery Tools for Bioinformatics	BBSRC	£39,750
PI Inductive Queries for Mining Patterns and Models	EU	£225,440
PI Development of an Ontology for Drug Screening & Design	BBSRC	£97,528
PI Machine Learning Approaches to Molecular Control	EPSRC	£155,409
Co-PI Molecular marker-assisted plant breeding on a genome scale	BBSRC	£250,000
Co-PI A Workflow-based High Throughput Toolkit for Primer Design	BBSRC	£102,878
Co-PI Metabolomics Centre	BBSRC	£299,984
Co-PI ART-An Ontology Based Article Preparation Tool	JISC	£100,000
Co-PI Robot Generated Open Access Data	JISC	£121,800
Co-Pi Development of Unified Data Standards and Data	FSA	£144,533

Major Invited Presentations

- Nov. 2019 International Conference on Systems Biology, Okinawa, Japan.
- Nov. 2019 AI³, Winchester.
- Aug. 2019 SAMSUNG Future Tech Forum, Korea.
- Jun. 2019 African Symposium on Big Data, Akure, Nigeria.
- May 2019 Science for Life Laboratory Summit, Uppsala, Sweden
- Mar. 2019 DeepMind, London.
- Nov. 2018 Materials Research Society, Boston.
- Aug. 2018 American Chemistry Society, Boston.
- Jun. 2018 Transform AI, Paris.
- Jan. 2018 European Robotics Conference, Tampere, Finland.

- Jan. 2018 Robotics and Semantic Systems for Biology, Tokyo, Japan.
- Nov. 2017 World Medical Robotics Conference, Shenzhen, China.
- Oct. 2017 OECD - AI: Intelligent Machines, Smart Policies, Paris, France
- Mar. 2017 International Symposium for Medicinal Sciences, Sendai, Japan.
- Mar. 2017 Japanese Pharmaceutical Society, Japan.
- Mar. 2017 American Physical Society, New Orleans.
- Mar. 2017 Vanderbilt University, Nashville.
- Aug. 2016 International Symposium on Medicinal Chemistry, Manchester.
- Jun. 2016 Robotics and Semantic Systems for Biology, Tokyo.
- Mar. 2016 Josef Stefan Institute, Slovenia
- Mar. 2016 Eurobotics, Slovenia
- Mar. 2016 Birla Institute of Technology and Science, Pilani – Goa campus, India
- Dec 2015 University of Waikato, New Zealand.
- Nov 2015 Information Sciences Institute, USC, Los Angeles.
- Sept. 2015 German AI Conference
- Sept. 2014 Bioledge, Finland.
- March 2014 The Society for the Study of Artificial Intelligence and Simulation of Behaviour (AISB). London
- Feb 2014 Bioenergy and Green Chemistry. Taiwan.
- Oct. 2013 Semantic, Social, and Mobile Applications for Bioinformatics and Biomedical Laboratories, Venice
- June 2013 Discovery Informatics, NASA Ames, California.
- June, 2013 Mathematics and biology of cancer, Paris.
- Nov. 2012 The EBI-Sanger-Cambridge PhD Symposium (Nobel Laureate Sir Paul Nurse spoke in 2013)
- Sep. 2012 European laboratory robotics interest group
- Jul. 2012 American Association of Artificial Intelligence Conference. Canada. (This is the most prestigious AI Conference).
- Jun. 2012 Aspen Ideas Festival.
- Feb. 2012 Society for Laboratory Automation and Screening. USA. (The main international laboratory automation conference)
- Nov 2011 The CBI (Chem-Bio Informatics) Society and the Japanese Society of Bioinformatics (JSBi) Joint Conference. Japan.
- May 2011 Modelling Complex Biological Systems in the Context of Genomics. France.
- Sep. 2009 Machine Learning in Systems Biology. Slovenia
- Jun. 2009 FEBS Yeast Systems Biology Course. Sweden
- Oct. 2008 Italian Association for Artificial Intelligence. Italy
- Apr. 2008 Society for Bioinformatics in Northern Europe. Poland.
- Jun. 2007 Grid-Asia. Singapore
- Dec. 2006 International Conference on Bioinformatics. India.
- Jun. 2006 Probabilistic Modeling and Machine Learning in Structural and Systems Biology. Finland
- Nov. 2005 Integrative Post-Genomics. France.
- Oct. 2005 Discovery Science, DS 2005. Singapore

Organisation of International Conferences

- *Inductive Logic Programming*: 14th International Conference, *ILP 2004*, Porto, Portugal, September 6-8, 2004

Major Contribution to Early Careers Scientists.

- Dr. Amanda Clare. My Ph.D. student Amanda Clare's thesis was runner-up in the British Computer Society award for best Thesis of the year. She was also my postdoc, and is now a senior lecturer- Aberystwyth University, UK
- Dr. Chuan Lu. My postdoc, now Academic - Aberystwyth University, UK
- Dr. Wayne Aubrey. PhD student and my postdoc, now Academic - Aberystwyth University, UK
- Dr. Larisa Soldatova. My postdoc, now Academic - Brunel University, UK
- Dr. Maria Liakata. My postdoc, now Academic - University of Warwick, UK

- Dr. Nathalie Marchand-Geneste. My postdoc, now Academic - Université de Bordeaux
- Dr. Sebastian Ferre. My postdoc, now Academic - IRISA, France
- Dr. Emma Byrne. My postdoc, now Academic - Open University, UK.
- Dr. Yihui Lu. My postdoc, now Academic - Shandong University, China
- Dr. Andreas Karwath. PhD and my postdoc, now researcher University of Mainz, Germany
- Dr. Amanda Schierz. My postdoc, now researcher - Institute of Cancer Research, UK
- Dr. David Enot. My postdoc, now researcher - Institut de Cancérologie, France
- Dr. Kurt De Grave. My employee, now researcher - KUL, Belgium
- Dr. Clare Q. PhD, now researcher - GCHQ, UK.
- Dr. Oliver Ray. Collaborator on postdoc, now Academic - University of Bristol, UK.
- Dr. Fang Zhou. Collaborator on PhD, now Academic – Nottingham Ningbo University, China.

Supervision Of Graduate Students And Postdoctoral Fellows

- Number of Postdocs ~ 40
- Number of PhD students ~ 20
- Number of Masters students ~ 20

Knowledge and Technology Transfer

Scientific Advisor

I am a scientific advisor to Elysium Health – along with five Nobel Laureates.

Spin-outs

In 2000 I was a founder of the spin-out company PharmaDM, which developed data mining tools for the pharmaceutical industry. The company was based largely on my research applying data mining to bioinformatics and cheminformatics. The other scientific founders come from the University of Oxford and Leuven. PharmaDM initially secured 750,000 Euros in capital. PharmaDM company was a victim of Pfizer's lab closure program.

Consulting

- Consultant for Pfizer
- Consultant for Unilever
- Consultant for Novozymes

Outreach and public engagement

The concept of a 'Robot Scientist' has repeatedly caught the public imagination. For example in August 2015 my research was exhibited in the London Science Museum. My research has been reported by: BBC TV World News, Radio in many countries, >1,000 articles written in newspapers and magazines around the world, including the Times, New York Times, LA Times, Washington Post, Hindustan Times, Straits Times, Economist, National Geographic, Economist, Wired, New Scientist, Scientific American, etc. The compendium of all published articles on my Science paper, provided to us by the BBSRC Press Office, runs to 266 pages. My most substantial effort at scientific popularisation was my article on Robot Scientists in the January 2011 edition of Scientific American.

Apart from my work on Robot Scientists, I have done a lot of work using music to explain the relationship between DNA and protein structure. Specifically, I developed an algorithm for converting protein coding DNA sequences into music with Colin Angus of the pop group The Shamen. Our song S2-translation based on this is mentioned in the "Rough Guide to Rock", and is on an album that has sold >100,000 copies – almost all to young people. A related java program is used in schools to explain the relationship between DNA and proteins. I was interviewed about this work on the prestigious BBC Today program.

I give popular lectures on my research on average about once a year. The most notable of these was when I talked at the 'Aspen Ideas Festival'. This is where the US political and business elite meet, very few scientists are invited. In April 2017 I talked at the International Festival of Science Documentary Films in the Czech Republic.