Alastair Beresford

Computer Laboratory,
15 JJ Thomson Avenue,
Cambridge. CB3 0FD

+44 1223 763597
http://www.cl.cam.ac.uk/users/arb33
Alastair.Beresford@cl.cam.ac.uk

Current Positions

- **University Lecturer**
  Computer Laboratory, University of Cambridge
- **Teaching Fellow & Director of Studies in Computer Science**
  Robinson College, University of Cambridge

Education

- Ph.D., University of Cambridge (2000 – 2004)
  Dissertation title: *Location privacy in ubiquitous computing*
- BA (Hons) Computer Science, University of Cambridge (1996 – 1999)

Research interests

- **Sensors and mobile computing** *Building sensor systems, sensor data inference, and novel uses of mobile devices.* Examples include building pollution sensors as part of the MESSAGE project [J14,J13], using GPS data from mobile devices to infer road network topology [J10] or commuting times [C19]; using cameras to recognise 2D fiducials [J7,C6]; collecting usage statistics from Android smartphones [C21].
- **Security and privacy** *Enhancing information and communication privacy through anonymisation, distributed computation and policy.* Examples include the Mix Zone Model for anonymising location data [J3,C3,R2], a privacy-aware congestion charging scheme [J4,C8], and an enhanced privacy policy system for Android smartphones [C20].
- **Programming distributed systems** *Improving the construction of distributed systems designed to collect sensor data from mobile devices.* Examples include creating a programming language which optimises sensor-driven computing applications [C14], e.g. for cars, vans and lorries [C11]; also explored methods of sharing computation blocks [R1] and dependability and accountability [C7].

Grants and projects

- Principal investigator of Privacy Calculus, a joint research project between Cambridge and TU Berlin to better understand how formal methods can be used to reason about negotiable privacy policies. Funded by the British Council and DAAD (2009 – 2011)
- Research co-investigator on TIME-EACM, building novel sensors, distributed systems, and statistical techniques to improve transport and travel infrastructure. Funded by EPSRC. (2005 – 2011)
- Team member of Computing for the Future of the Planet, a framework to explore how computing can address major problems facing the planet. Goals: an optimal digital infrastructure, sensing and optimising with a global world model, reliably predicting and reacting to our environment, and digital alternatives to physical activities. Funded by internal funds and by a Google Focused Research Award. (2007 – present)
- Team member of the MESSAGE project, which aims to understand how a new breed of small electro-chemical sensors connected to mobile phones can be used to build a real-time picture of urban pollution in unprecidented detail. Funded by EPSRC and DfT. (2006 – 2010)
- Undergraduate research opportunities programme co-led with Andrew Rice. We take 6-8 Cambridge undergraduates for ten weeks; students build research prototypes with smartphones. Raised funding from Redgate (2011, 2010) and BT/ESPRC (2009).

Research students

- ◇ **Sören Preibusch** *Primary Supervisor.* Researching the models, principles and tools to support negotiable privacy policies.
- ◇ **Mattias Linnap** *Second Advisor.* Managed participatory sensing.
- ◇ **Julien Quintard** *Second Advisor.* Towards a worldwide storage infrastructure.
- ◇ **Robin Message** *Second Advisor.* Tools for end-user database programming.
- ◇ **Jonathan Davies** *Second Advisor.* Programming networks of vehicles. Completed. Available as Computer Laboratory Technical Report 761.

Teaching

- ◇ **Undergraduate course lecturer** Co-designed and wrote two new Java programming courses taken by all first- and second-year computer science students with Andrew Rice; material is taught in a practical class format with demonstrators (2008 – present). Created and delivered a new second-year C & C++ programming course (2006 – 2008).
- ◇ **Dissertation supervisor** supervised seven final year undergraduate projects in graphics and mobile computing; all achieved high marks, one won an outstanding dissertation award. (2001 – present)
- ◇ **Small group teacher** Supervisions for several Cambridge Colleges in Engineering and Computer Science, including operating systems, data structures & algorithms, comparative programming languages, probability, software engineering, computer graphics and image processing, security, digital communications, databases, artificial intelligence, and professional practice and ethics. (2000 – present)

Outreach

- ◇ Co-organise the annual Computer Laboratory Open Days for school pupils together with Robert Harle. (since 2007)
- ◇ Co-organise and deliver the Computer Science lectures on the Oxbridge Conference tour together with Robert Harle. The is part of Cambridge University's access scheme, delivered at six locations around the country to circa 10,000 school pupils. (since 2008)
- ◇ Co-organise and run *CS Cubed* together with Robert Harle. CS Cubed is the Computer Laboratory annual competition for school pupils to encourage uptake of the subject at university; see http://www.cscubed.org for further information. (2010, 2011)

Awards and Prizes

- ◇ Research Fellow, Robinson College, Cambridge (2005 – 2006)
- ◇ Sponsored Ph.D. student, AT&T Labs – Cambridge (2000 – 2003)
- ◇ Scholar, Robinson College, University of Cambridge (1998 – 2004)
- ◇ Sponsored 'A' level and undergraduate student, BT Laboratories (1994 – 1999)

Previous Positions

- ◇ RCUK Academic Fellow and faculty member at the University of Cambridge Computer Laboratory (January 2007 – December 2011). Responsibilities included preparing and delivering undergraduate lectures and supervising PhD students and RAs.
- ◇ Visiting Scientist, Google London (January – June 2011). Amongst other things, wrote a Java implementation of the Open Source Nigori Protocol.
- ◇ Research Associate, University of Cambridge Computer Laboratory (2004 – 2007). Worked on EPSRC TIME-EACM grant (2005 – 2007) and EPSRC High-Level Languages for Programmable Networks (2004 – 2005)
- ◇ Senior Technical Associate, Fraser Research, Princeton, NJ, USA. (Summer 2004) Evaluation of a digital rights management system and design and analysis of a naming scheme for future computer and communication networks.
- ◇ Internship, AT&T Labs – Research, Florham Park, NJ, USA. (Summer 2001) Designed and implemented a dynamic routing algorithm for 155Mb/s optical fibre residential cable network.
- ◇ Researcher, BT Labs, Martlesham Heath, Suffolk, UK (1999 – 2000) Built a 2 GHz three-dimensional radio channel sounder, analysed ad-hoc network routing strategies and managed the BT Virtual University Research Initiative on Mobility.

Programme Committees

- ◇ IEEE International Symposium on Policies for Distributed Systems and Networks 2012
- ◇ Privacy Enhancing Technologies (PET) 2010, 2009, 2008, 2007, 2006
  Proceedings published by Springer-Verlag
- ◇ Distributed Applications and Interoperable Systems (DAIS) 2010, 2009, 2008
  Proceedings published by Springer-Verlag
- ◇ Programming Language Approaches to Concurrency and Communication-cEntric Software (PLACES) 2010, 2009 [PC co-chair], 2008
  At ETAPS 2010, 2009 and IFIP DisCoTec 2008
- ◇ ACM Mobile and Ubiquitous Multimedia (MUM) 2012, 2010, 2009
- ◇ International Conference on Geosensor Networks (GSN) 2009, 2006
  Proceedings published by Springer-Verlag
- ◇ Workshop on Privacy-Aware Location-based Mobile Services (PALMS) 2009, 2008, 2007
  IEEE International Conference on Mobile Data Management (MDM)
- ◇ Pervasive 2009
  Proceedings published by Springer-Verlag
- ◇ Workshop on Privacy in the Electronic Society (WPES) 2008
  At ACM Conference on Computer and Communications Security (CCS) 2008
- ◇ Internet of Things 2008
  Proceedings published by Springer-Verlag
- ◇ International Workshop on Pervasive Systems (PerSys) 2007
  Proceedings published by Springer-Verlag
- ◇ Workshop on UbiComp Privacy 2007
  At UbiComp 2007. Proceedings published by Springer-Verlag
- ◇ Workshop on *From Theory to Practice in Wireless Sensor Networks* 2007
  At IEEE Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM)
- ◇ IEEE Workshop on Trust, Security and Privacy for UbiComp (TSPUC) 2007
- ◇ IEEE Workshop on Pervasive Computing and Comms Security (PerSec) 2006
- ◇ International Conference on High Performance Computing and Comms (HPCC) 2006
- ◇ ACM Workshop on Wireless Security 2006 (held at ACM MobiCom) 2006
- ◇ International Conference on Ubiquitous Convergence Technology (ICUCT) 2006
  Proceedings published by Springer-Verlag

Journal, Magazine and Book Contributions

J17 Alastair R. Beresford, Dorothea Kübler, Sören Preibusch. Unwillingness to Pay for Privacy: A Field Experiment, Economics Letters, Elsevier, to appear, 2012.

J16 Jean Bacon, Andrei Iu. Bejan, Alastair R. Beresford, David Evans, Richard J. Gibbens and Ken Moody. Using Real-Time Road Traffic Data to Evaluate Congestion. Dependable and Historic Computing, Lecture Notes in Computer Science, 6875:93-117, 2011. ISSN 0302-9743.

J15 Alastair R. Beresford and Simon Gay *(Editors)* Proceedings of the Second International Workshop on Programming Language Approaches to Concurrency and Communication-cEntric Software. Electronic Proceedings of Theoretical Computer Science 17, February 2010. ISSN 2075-2180.

J14 Robin North, Jeremy Cohen, Steven Wilkins, Mark Richards, Neil Hoose, John Polak, Margaret Bell, Phil Blythe, Bayan Sharif, Jeff Neasham, Visalakshmi Suresh, Fabio Galatioto, Graeme Hill, Iq Mead, Rod Jones, Alastair Beresford, Haibo Chen, Karl

Ropkins, Paul Goodman, Colin Oates, James Tate, Narasimha Ballijepalli. Field deployments of the MESSAGE system for environmental monitoring. Traffic Engineering and Control 50(11):484-488, 2009.

J13 Jeremy Cohen, Robin North, Steven Wilkins, John Darlington, Yike Guo, Neil Hoose, Yajie Ma, John Polak, Visalakshmi Suresh, Paul Watson, Margaret Bell, Phil Blythe, Jeff Neasham, Mark Calleja, Mark Hayes, Alastair Beresford, Rod Jones, Iq Mead. Creating the MESSAGE infrastructure. Traffic Engineering and Control 50(11):480-483, 2009.

J12 David Evans, Jean Bacon, Alastair R. Beresford, Richard Gibbens and David Ingram. Time for change. Intertraffic World. 1(1):52-56, 2009.

J11 Andy Hopper, Andrew Rice and Alastair Beresford. Computing for the future of the planet. Engineering Change: Towards a sustainable future in the developing world. Pages 73–79. Royal Academy of Engineering. 2008. ISBN 1-903496-41-1.

J10 David N. Cottingham, Alastair R. Beresford and Robert K. Harle. Observations on the Practical Implementation of National-Scale Road User Charging. Transport Reviews 27(4):499-523, 2007. Taylor & Francis.

J9 Jonathan J. Davies, Alastair R. Beresford and Andy Hopper. Scalable, Distributed, Real-time Map Generation. IEEE Pervasive Computing 5(4):47-54, 2006. IEEE Press.

J8 Alastair R. Beresford and Jean Bacon. TIME for Better Transport. *Short work in progress report.* IEEE Pervasive Computing 5(4):63, 2006. IEEE Press.

J7 Andrew C. Rice, Robert K. Harle and Alastair R. Beresford. Analysing fundamental properties of marker-based vision system designs. Personal and Mobile Computing, 2(4):453-471, 2006. Elsevier B. V.

J6 Alastair Beresford and David Scott. Data Privacy. Invited submission in Wiley Encyclopedia of Computer Science and Engineering (Benjamin Wah, ed.), John Wiley & Sons, Inc, 2008.

J5 Alastair R. Beresford. Privacy issues in geographic information technologies. Invited book chapter in Frontiers of Geographic Information Technology, 2006. Springer-Verlag. ISBN 3-540-25685-7.

J4 Robert Harle and Alastair Beresford. Keeping Big Brother off the road. IEE Review. 51(10):34-37, October 2005. ISSN 0953-5683.

J3 Alastair R. Beresford and Frank Stajano. Location Privacy in Pervasive Computing. IEEE Pervasive Computing, 2(1):46-55, 2003.

J2 Alastair Beresford, Csaba Kiss Kallo, Ursula Kretschmer, Friedemann Mattern and Martin Muehlenbrock. The First Summer School on Ubiquitous and Pervasive Computing. IEEE Pervasive Computing, 2(1):84-88, 2003.

J1 R. M. Dennis, A. R. Beresford and K. M. Brown. Virtual University Research Initiative on Mobility. BT Technology Journal, 19(1):12-18, 2001.

Refereed Conference and Workshop Papers

C21 Alastair R. Beresford, Andrew Rice, Nicholas Skehin and Ripduman Sohan. MockDroid: trading privacy for application functionality on smartphones. Proceedings of the 11th Workshop on Mobile Computing Systems and Applications (HotMobile), 2011. To appear. ACM Press.

C20 Daniel T. Wagner, Andrew Rice, Alastair R. Beresford. Device Analyser. (Extended Abstract and Poster.) Proceedings of the 11th Workshop on Mobile Computing Systems and Applications (HotMobile), 2011. To appear. ACM Press.

C19 Andrei Bejan, Richard Gibbens, David Evans, Alastair Beresford, Jean Bacon and Adrian Friday. Statistical Modelling and Analysis of Sparse Bus Probe Data in Urban Areas. Proceedings of the 13th IEEE Conference on Intelligent Transportation Systems, p1256–1263, 2010. IEEE Press.

C18 Simon Hay, Stamatina Th. Rassia and Alastair Beresford. Estimating personal energy expenditure with location data. In Proceedings of the IEEE Workshop on Pervasive Healthcare (PerHealth), p304–309, 2010. IEEE Press. (PerHealth was a workshop at PerCom 2010.)

C17 Andrew Rice, Paula Buttery, Idris A. Rai and Alastair Beresford. Language learning on a next-generation service platform for Africa. W3C Workshop on an African Perspective on the Role of Mobile Technologies in Fostering Social and Economic Development, Maputo, Mozambique, 2009.

C16 Sören Preibusch and Alastair R. Beresford. Establishing Distributed Hidden Friendship Relations. Seventeenth International Workshop on Security Protocols (SPW), Cambridge, England, 1-3 April 2009.

C15 Sören Preibusch and Alastair R. Beresford. Privacy-Preserving Friendship Relations for Mobile Social Networking. W3C Workshop on the Future of Social Networking, Barcelona, Spain, 2009.

C14 Jonathan J. Davies, Alastair R. Beresford and Alan Mycroft. Language-based optimisation of sensor-driven distributed computing applications. Proceedings of Fundamental Approaches to Software Engineering (FASE), LNCS 4961, p407–422, 2008. Springer-Verlag. (FASE is a conference at ETAPS 2008.)

C13 Jean Bacon, Alastair R. Beresford, David Evans, David Ingram, Niki Trigoni, Alexandre Guitton and Antonios Skordylis. TIME: An open platform for capturing, processing and delivering transport-related data. Proceedings of IEEE Consumer Communications and Networking Conference, p687–691, 2008. IEEE Press.

C12 Jonathan J. Davies and Alastair R. Beresford. Scalable Inter-Vehicular Applications. Proceedings of the Second International Workshop on Pervasive Systems (PerSys), LNCS 4806, p876–885, 2007. Springer-Verlag.

C11 David Evans, Alastair R. Beresford, Trevor Burbridge and Andrea Soppera. Context-derived Pseudonyms for Protection of Privacy in Transport Middleware Applications. Proceedings of the IEEE Workshop on Pervasive Transport (PerTrans), p395–400, 2007. IEEE Press. (PerTrans was a workshop in PerCom 2007.)

C10 Joonwoong Kim, Alastair R. Beresford and Frank Stajano. Towards a Security Policy for Ubiquitous Healthcare Systems. Proceedings of the First International Conference on Ubiquitous Convergence Technology (ICUCT), LNCS 4412, 2007. Springer-Verlag.

C9 Alastair R. Beresford, Jonathan J. Davies and Robert K. Harle. Privacy-Sensitive Congestion Charging. Proceedings of the Fourteenth International Workshop on Security Protocols, LNCS 5087, p97–104, 2006. Springer-Verlag.

C8 Richard Sharp, James Scott and Alastair R. Beresford. Secure mobile computing via public terminals. Proceedings of the Fourth International Conference on Pervasive Computing (Pervasive), LNCS 3968, p238–253, 2006. Springer-Verlag.

C7 Andrew C. Rice and Alastair R. Beresford. Dependability and accountability for context-aware middleware systems. Proceedings of the IEEE Workshop on Middleware Support for Pervasive Computing (PerWare), p378–382, 2006. IEEE Press. (PerWare was a workshop in PerCom 2006.)

C6 Andrew C. Rice, Alastair R. Beresford and Robert K. Harle. Cantag: an open source software toolkit for designing and deploying marker-based vision systems. Proceedings of the Fourth IEEE International Conference on Pervasive Computing and Communications (PerCom), p12–21, 2006. IEEE Press.

C5 Sarah Mount, Elena Gaura, Robert M. Newman, Alastair R. Beresford, Sam R. Dolan and Michael Allen. Trove: a physical game running on an ad-hoc wireless sensor network. Proceedings of the Joint Conference on Smart Objects and Ambient Intelligence, p235–239, 2005. ACM.

C4 Kieran Mansley, Alastair R. Beresford and David Scott. The carrot approach: encouraging the use of location systems. Proceedings of the Sixth International Conference on Ubiquitous Computing (UbiComp), LNCS 3205, p366–383, 2004. Springer-Verlag.

C3 Alastair R. Beresford and Frank Stajano. Mix Zones: User privacy in location-aware services. Proceedings of the IEEE Workshop on Pervasive Computing and Communication Security (PerSec), p127–131, 2004. IEEE Press. (PerSec was a workshop in PerCom 2004.)

C2 David Scott, Alastair Beresford and Alan Mycroft. Spatial Security Policies for Mobile Agents in a Sentient Computing Environment. Proceedings of Fundamental Approaches to Software Engineering (FASE), LNCS 2621, p102–117, 2003. Springer-Verlag. (FASE was a conference at ETAPS 2003.) *This paper was awarded the Best Software Science Paper prize at ETAPS 2003.*

C1 David Scott, Alastair Beresford and Alan Mycroft. Spatial Policies for Sentient Mobile Applications. Proceedings of the IEEE Fourth International Workshop on Policies for Distributed Systems and Networks (IEEE Policy), p147–157, 2003. IEEE Press.

Other Reports and Papers

R3 David Evans and Alastair R. Beresford. Psuedonymous context-aware transport applications. Proceedings of the UK-Ubinet Workshop, 2006.

R2 Alastair R. Beresford. Location privacy in ubiquitous computing (Ph.D. dissertation), University of Cambridge Computer Laboratory Technical Report UCAM-CL-TR-612, 2005.

R1 Alastair R. Beresford and Andrew C. Rice. Towards automated computation sharing for ubiquitous computing. British Council Workshop on Proactive Computing, Nizhni Novgorod, Russia. 2005.

Selected Academic Talks

T6 *Using sensors to improve public and private transport.* Invited talk at the British Council's Conference on Green ICT and Sensors in Gothenburg, 2010.

T5 *Pollution monitoring in the streets of Cambridge.* Invited talk at the Christ's College Transport Event, 2009. Joint talk with Prof. Rod Jones.

T4 *TIME for better privacy.* Keynote talk at the Workshop on Privacy-Aware Location-based Mobile Services (PALMS) 2007; IEEE International Conference on Mobile Data Management (MDM'07).

T3 *Privacy issues in geographic information technologies.* Invited talk at the Association of American Geographers Annual Meeting, 2006.

T2 *Location privacy: technical issues and approaches.* Invited talk at BT Laboratories, Martlesham Heath, Suffolk, 2004.

T1 *Location privacy. Security Seminar Series*, University of Cambridge Computer Laboratory, 2004.