

Andrew Twigg

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Introduction

I'm currently a junior research fellow in computer science at Oxford University. My interests are broadly in algorithms related to "big data" (e.g. write-optimized indexing, sketching, streaming), distributed computing, databases and networks (e.g. compact routing).

My skills are in applying deep technical ideas, from both original and existing research, to solve real technical problems. My approach to research is a mixture of short periods of deep thought followed by implementation and evaluation of ideas in code. I enjoy working in small teams, where I can spend significant amounts of time with each member. I am a technical sceptic and find that this has served me well; some of the most interesting solutions have been to problems arising this way. I have experience in a variety of environments: academic departments, industrial research labs, and founding startups.

In 2009 I co-founded Acunu, a storage/database startup commercializing work on high-speed indexing and streaming analytics for Big Data, and contributing to Apache Cassandra. We also started the popular London Big Data meetup, now the largest European Big Data community. At Acunu, I led the technical roadmap; I invented and led development of the main algorithms (in particular, 'Stratified B-trees' – write-optimized, fully-versioned indexing – and 'Acunu Analytics' – write-optimized materialized views for approximate aggregate queries). By 2012 we had around 30 employees (15 PhDs), submitted over 15 patents, and raised over \$10m in VC funding.

In my PhD, I introduced the notion of 'forbidden-set' (or failure-tolerant) compact routing, requiring to compute low-stretch paths around a set of failed edges. This has proved to be a deep and fruitful topic.

Education

2002–2006	PhD Computer Science, Cambridge University, UK. Thesis: <i>Forbidden-Set Compact Routing</i> Nominated for BCS (British Computer Society) Best Dissertation Award
1999–2002	BSc Computer Science, Warwick University, UK (1st class) Thesis: <i>Lightweight web prediction algorithms</i> Best overall student each year and top graduating student

Positions

10/08–present	Junior Research Fellow in Computer Science, Oxford University <i>Elected by open competition</i>
07/09–06/12	Co-founder and CTO, Acunu <i>Acunu is a startup commercializing indexing and analytics technology for Apache Cassandra</i>
2/08–9/08	Postdoc researcher, Computer Science, Cambridge University. <i>Topic: Network routing problems. Advisor: Jon Crowcroft</i>
11/06–11/07	Thomson (now Technicolor) Research, Paris, France <i>Topic: Decentralized randomized broadcasting and live streaming algorithms</i>
03/06–07/06	Research Intern, Microsoft Research, Cambridge, UK <i>Topic: Decentralized randomized broadcasting and live streaming algorithms</i>
05/03–10/03	Marie Curie Fellow, BRICS (Basic Research in CS) Institute, Aarhus University, Denmark <i>Topic: Decentralized computation of fixed points in security algorithms</i>
06/01–09/01	Intern, Credit Suisse, London
06/01–09/01	Research Intern, IBM Hursley, UK
06/00–09/00	Research Assistant, Computer Science, Warwick University

Teaching

2008–11	Oxford University <i>Randomized Algorithms, Advanced Data Structures and Algorithms</i>
2003–06	Cambridge University <i>Algorithms and Data Structures, Mathematical Methods in Computer Science, Probability, Complexity Theory</i>

Selected Publications

- 2011 Andy Twigg, Andrew Bye, Grzegorz Miłos, Tim Moreton, John Wilkes, and Tom Wilkie. Stratified B-trees and versioned dictionaries. In *Proceedings of the 3rd USENIX conference on Hot topics in storage and file systems*, HotStorage'11, pages 10–10, Berkeley, CA, USA, 2011. USENIX Association
- Andrew Bye and Andy Twigg. Optimal query/update tradeoffs in versioned dictionaries. *CoRR*, abs/1103.2566, 2011
- 2010 Bruno Courcelle and Andrew Twigg. Constrained-path labellings on graphs of bounded clique-width. *Theory Comput. Syst.*, 47(2):531–567, 2010
- 2008 Thomas Bonald, Laurent Massoulié, Fabien Mathieu, Diego Perino, and Andrew Twigg. Epidemic live streaming: optimal performance trade-offs. In Zhen Liu, Vishal Misra, and Prashant J. Shenoy, editors, *SIGMETRICS*, pages 325–336. ACM, 2008
- Andrew Twigg. Worst-case time decremental connectivity and k-edge witness. *CoRR*, abs/0810.5477, 2008
- Bruno Courcelle, Cyril Gavoille, Mamadou Moustapha Kanté, and Andrew Twigg. Connectivity check in 3-connected planar graphs with obstacles. *Electronic Notes in Discrete Mathematics*, 31:151–155, 2008
- Laurent Massoulié and Andrew Twigg. Rate-optimal schemes for peer-to-peer live streaming. *Perform. Eval.*, 65(11-12):804–822, 2008
- 2007 Laurent Massoulié, Andrew Twigg, Christos Gkantsidis, and Pablo Rodriguez. Randomized decentralized broadcasting algorithms. In *INFOCOM*, pages 1073–1081. IEEE, 2007
- Bruno Courcelle, Cyril Gavoille, Mustapha Kante, and Andrew Twigg. Forbidden-set labelling on graphs. *Second Workshop on Locality Preserving Distributed Computing Methods (LOCALITY)*, co-located with *PODC*, 2007
- Bruno Courcelle and Andrew Twigg. Compact forbidden-set routing. In Wolfgang Thomas and Pascal Weil, editors, *STACS*, volume 4393 of *Lecture Notes in Computer Science*, pages 37–48. Springer, 2007
- Karl Krukow and Andrew Twigg. The complexity of fixed point models of trust in distributed networks. *Theor. Comput. Sci.*, 389(3):528–549, 2007
- 2006 Andrew D. Twigg. Compact forbidden-set routing. Technical Report UCAM-CL-TR-678, University of Cambridge, Computer Laboratory, December 2006
- 2005 Karl Krukow and Andrew Twigg. Distributed approximation of fixed-points in trust structures. In *ICDCS*, pages 805–814. IEEE Computer Society, 2005
- 2003 Andrew Twigg and Nathan Dimmock. Attack-resistance of computational trust models. In *WETICE*, pages 275–280. IEEE Computer Society, 2003
- Andrew Twigg. A subjective approach to routing in p2p and ad hoc networks. In Nixon and Terzis [12], pages 225–238
- Tim Moreton and Andrew Twigg. Trading in trust, tokens and stamps. In *Proceedings of the 2nd Workshop on Economics of Peer-to-Peer Systems*, Berkeley, CA, 2003

Interests

I enjoy sports (golf, rowing, cycling), music, cars and science and technology in general. In 2005 I rowed for Cambridge Lightweight (Granta) against Oxford. From 2002 until 2007 I rowed for King's College 1st VII boat and was vice-captain in 2004, winning the men's Fairbairns IV race in 2006. I took up drumming in 1996 and was given the highest grade 8 distinction result in 1998. I most enjoy playing big band music and with small jazz groups including University Big Bands and elsewhere. I currently enjoy golf and cycling, having done some Tour de France stages including Alpe D'Huez. I look forward to having a garage big enough to build a sports car.