

Dr A D Twigg

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Research interests

I am interested in combinatorial problems and algorithms on graphs and networks, in particular routing and problems in peer-to-peer networks such as broadcasting. I am also interested in load balancing schemes and, in general, algorithms on graphs.

Compact routing: During my PhD, I studied so-called constrained compact routing problems, which generalise compact routing from shortest paths to the notion of path algebras over labelled graphs. I also studied the so-called 'forbidden-set' routing problem of efficiently routing around arbitrary subsets of a network. Previously, it was only known how to handle the case of a single forbidden edge. This was nominated for the British Computer Society best dissertation award.

Epidemic streaming: During my postdoc, I studied epidemic-style scheduling strategies for broadcasting data streams over a network, with applications to live streaming and video-on-demand. Previously, it was not known whether epidemic approaches could achieve rate and delay optimality. We gave a proof that a randomized epidemic scheduling can achieve both simultaneously.

Education

2006 *PhD Computer Science, Cambridge University, UK*
Title: Compact Forbidden-set Routing (supervised by Dr Ken Moody)
Nominated for British Computer Society best dissertation award 2007

2002 *BSc Computer Science, Warwick University, UK*
Best overall graduating student each year (90% average)

1999 *St Catherine McAuley High School, Doncaster, UK*
British Physics Olympiad (Bronze Medal, Class One), S-Levels in Physics (1), Chemistry (1)
A-Levels in Maths, Physics, Chemistry, Electronics (AAAA), Theology (C), General Studies (B)

Employment

Oct 08 - Junior research fellow, St John's College, Oxford. I am also a member of the Combinatorics group at the mathematics institute and the computing laboratory.

Feb - Sep 2008 Postdoc, Computer Laboratory, Cambridge University.

Nov 07 - Jan 08 Consultant at Greycon Ltd. I worked on a combinatorial optimization algorithm for a factory scheduling problem.

Nov 06 - Nov 07 Postdoctoral research scientist, Thomson Research, Paris
Topic: scheduling strategies for efficient broadcasting of live and video-on-demand streams

Spring 2006 Research Intern, Microsoft Research, Cambridge, UK
Topic: decentralized broadcasting algorithms for live streaming

Summer 2003 Marie Curie Visiting Fellow, BRICS (Basic Research in Computer Science), Denmark
Topic: Distributed computation of fixpoints in networks

Summer 2002 Intern, IBM Hursley, UK (part of Extreme Blue programme)

Spring 2002 Teaching Assistant, Maths Institute, Warwick University (Programming for Scientists)

Summer 2001 IT Intern, Credit Suisse First Boston, London

Summer 2000 Research Assistant, Computer Science Department, Warwick University

Awards

2007 PhD thesis nominated for British Computer Society Distinguished Dissertation Award

2005 Grant from King's College Cambridge for writing up PhD thesis

2005 Cambridge Philosophical Society Studentship Award

2003 Visiting Marie Curie Fellow at BRICS, University of Aarhus, Denmark

2002 Funding for PhD from BTextact and EPSRC

2002 Top graduating student in Computer Science, Warwick University

2001 Best overall computer science performance each year at Warwick University

1999 Several awards for outstanding local contribution to music, Doncaster and South Yorkshire

Selected publications

Epidemic streaming: optimal performance tradeoffs. L. Massoulié et al. SIGMETRICS 2008.

Optimal connectivity labelling for 3-connected planar graphs. B. Courcelle, C. Gavoille, M. Kanté and A. Twigg. Conference on topological and geometric graph theory, Paris 2008.

Forbidden-set labelling on graphs. B. Courcelle, C. Gavoille, M. Kanté and A. Twigg. LOCALITY workshop, PODC 2007

Compact forbidden-set routing. B. Courcelle and A. Twigg. STACS 2007

Compact forbidden-set routing. PhD Thesis, University of Cambridge Report UCAM-CL-TR-678

Randomized decentralized broadcasting algorithms. L. Massoulié, A. Twigg, C. Gkantsidis, P. Rodriguez. INFOCOM 2007

The complexity of fixed-point models of trust in distributed networks. K. Krukow and A. Twigg. Theoretical Computer Science, 2007

Trading in trust, tokens and stamps. T. Moreton and A. Twigg. Workshop on Economics of Peer-to-Peer Systems, 2003

Teaching experience

I have supervised the following courses regularly at the Computer Laboratory: complexity theory, algorithms, regular languages, mathematical methods, computer systems modelling, and probability.

Interests and activities

I enjoy music and sports, in particular drumming, rowing and cycling (roughly in that order). In 2005 I rowed for Cambridge University Lightweight (Granta) against Oxford. From 2002 until 2006 I rowed for King's 1st VIII, vice captain 2004-5. We won the University Fairbairns men's IV race in 2006. I have played drums since 1996. In 1998 was awarded the highest distinction at grade 8, and have played with jazz groups including Doncaster Youth Jazz Orchestra (which was awarded the BBC Big Band of the year), Cambridge University Jazz Orchestra, CU Fitz Swing Band (recording a live CD in 2002) and Warwick University Big Band. I have been on several tours in Europe and played on live TV.

References

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