

# Amitabh Trehan

## Contact Information

amitabh.trehaan@gmail.com  
+44-(0)15-0922-2564(Office)  
+44-(0)74-6667-0830(Cell Phone)  
Web: [www.amitabhtrehan.net](http://www.amitabhtrehan.net)  
Blog: [www.huntforthewel.wordpress.com](http://www.huntforthewel.wordpress.com)

## Postal Address

Computer Science  
Loughborough University  
Epinal Way, Loughborough  
Leicestershire, UK  
LE11 3TU

## Research Interests

My broad research interests are in CS theory and algorithms, especially those arising from or applicable to real world and human engineered systems. I have specific interests in distributed algorithms, complexity, networks, graph theory, and game theory. Current work includes designing efficient distributed algorithms for robustness/self-healing/self-\* properties in systems under attack from a computationally unbounded adversary, questions about algorithms in distributed and biological systems, and game theoretic and other mechanisms for evolving and dynamic networks, such as Peer-to-peer and social networks. I am a fellow of the UK Higher Education Academy (**FHEA**) and fulfill various teaching and administration roles including undergraduate final year project coordinator.

## Education

Ph.D.(with distinction), Computer Science, *University of New Mexico*, May 2010  
Dissertation: "Algorithms for self-healing in networks", advised by Prof. Jared Saia  
UNM Deans Dissertation Award  
Nominee, Principles of Distributed Computing Doctoral Dissertation Award, 2012

M.Tech. Computer Applications (Mathematics interdisciplinary program), *Indian Institute of Technology, Delhi*, Dec 2002  
Thesis: "A proposal for a phonetic based encoding for Indic scripts", advised by Profs. Sanjiva Prasad and Wagish Shukla

M.C.A. (Masters in Computer Applications), *Indira Gandhi National Open University*, Delhi, Dec 1999  
Thesis: "Neural Networks and Fuzzy logic", advised by Prof. Wagish Shukla, IIT Delhi

B.Sc. Biology, *Punjab University*, June 1994

Postgraduate Certificate in Higher Education and Teaching, *Queen's University Belfast (QUB)* (leading to **Fellowship of Higher Education Academy (FHEA)**), June 2016

## Professional Experience

Assistant Professor (UK: Lecturer) (Feb 2017 - ), Computer Science, School of Science, *Loughborough University, Loughborough*

Assistant Professor (UK: Lecturer) (Oct 2013 - Jan2017), Computer Science, EECS, *Queen's University, Belfast*  
- *High Performance and Distributed Computing Cluster*,  
- *Centre for Data Science and Scalable Analytics Systems*, ECIT-2 Global Research Institute.

I-CORE Postdoctoral Research Fellow (Apr 2013 - Oct 2013 ), School of Engineering and Computer Science, *Hebrew University of Jerusalem* (with Prof. Danny Dolev)

Post-doctoral Fellow (October 2010 - April 2013), Information Systems, Faculty of Industrial Engineering and Management, *Technion-IIT*, Haifa, Israel (with Profs. Shay Kutten and Ron Lavi)

Post-doctoral Researcher (May - September 2010), Computer Science, *University of Victoria*, Canada. (with Prof. Valerie King)

Research Associate (June 2010), Computer Science, *Brown University* (with Prof. Gopal Pandurangan)

Research Assistant (2005-May 2010, 2004), Computer Science, *University of New Mexico*, U.S.A. (with Prof. Jared Saia, Prof. David Bader respectively)

Research Assistant (2005), UNM Biology/ T-10, theoretical biology, *Los Alamos National Lab* (with Dr. William Hlavacek)

Visiting faculty (Fall 2003): Management Studies *Indian Institute of Technology*, Roorkee, India

Project Officer (1999 - 2004): Laboratory for Informatics in the Liberal Arts *Mahatma Gandhi International Hindi University*, Delhi and Wardha, India

Faculty (1996 - 1997): *National Institute of Information Technology*. Gurgaon, India

## Courses/Modules taught

Note: Only University level, full time taught courses listed

COA105: "Introduction to Algorithms", CS Part A, Spring 2017 - , LU

COB232: "Operating Systems, Networks and the Internet-2 (OSNI-2)", CS Part B, Spring 2016 -, LU

CSC2047: "Theory of Computing", B.Eng. CS, Spring and Fall, 2016-17, QUB

CSC2001: "Data Structures and Algorithms", B.Eng. CS/SE, Spring 2016-17, QUB

CSC7052: "Databases", M.Sc (Software Engineering) Fall 2013-15, QUB

"Database Management Systems", M.B.A., Fall 2003, IIT Roorkee

## Other Trainings

*Royal Society's Residential Communication and Media Course*, Royal Society, Nov 2017

Complex Systems Summer School (CSSS), *Santa Fe Institute*, Santa Fe, 2007

Advanced Diploma in Computer Applications, *National Institute of Information Technology*, Gurgaon, India, 1994 - 1996

## Awards and Honors

EPSRC First Grant, "Compact Self-Healing and Routing Over Low Memory Nodes", 2017-18

London Maths Society Scheme 7 Grant (travel collaboration grant) 2017

Visiting Professorship, University of Marseille, France, Spring/Summer 2017

Newton Fund International Collaboration Programme AMC Mobility Grant, 2016. (For a joint project with Prof. Armando Castaneda, Universidad Nacional Autonoma de Mexico), Aug-Sep 2016

Best paper runner-up at *ICDCN 2016*: “Compact Routing Messages in Self-Healing Trees”

Winner, Internal QUB competitions: i) EEECS International Doctoral Training Centre PhD studentship, ii) Faculty of EPS applied maths sandpit competition (PI on interdisciplinary CS-Maths-Phy-Bio proposal)

Newton Incoming Fellowship, 2013 of the Royal Society (at Royal Holloway University of London). Highly competitive (6% - 8% success rate) with financial support of upto £126,000

Israeli Centres of Research Excellence (I-CORE) postdoctoral fellowship, 2013

Best paper runner-up at *PODC 2013* (invited to JACM): “On the Complexity of Universal Leader Election”

Best paper at *ICDCN 2013*: “Sublinear Bounds for Randomized Leader Election”

Nominee (Ph.D. dissertation), Principles of Distributed Computing Doctoral Dissertation Award, 2012

Distinction, Ph.D., University of New Mexico, 2010

Graduate Dean’s Dissertation Fellowship, University of New Mexico, 2009-2010

College Color, public speaking, DAV College, Punjab University, 1994

## Funding

PI, EPSRC First Grant, “Compact Self-Healing and Routing Over Low Memory Nodes (COSHER) (Reference: EP/P021247/1)”, Approx £125,000. 2017-19

LMS Scheme 7 Grant, London Maths Society (£500 collaborative grant), 2017

Newton Fund International Collaboration Programme AMC Mobility Grant, 2016 (6 weeks at Universidad Nacional Autonoma de Mexico), Newton Fund/Mexico Academy of Sciences, Aug-Sep 2016. (£2,000 and travel cost).

Co-I, H2020 Future Emerging Technologies(FET)- HPC (FETHPC-1-2014), “AllScale: An Exascale Programming, Multi-objective Optimisation and Resilience Management Environment Based on Nested Recursive Parallelism”. Approx €3.4 Million (QUB component approx €450,000 ( £300,000))

Newton Incoming Fellowship, “Self-healing framework for managed network architectures”. £66,000, 2014-2015; £60,000, 2016-2026

## Selected Publications

**Note: In theory conferences and journals, author names are almost always in alphabetical order. Citation count(C) is from Google Scholar (on Nov 20, 2018): h-index: 11, total citations= 386. Conference acceptance rates(A) where available have been used.**

## Journals

J1 Armando Castaeda, Jonas Lefevre, Amitabh Trehan, “Self-healing Routing and Other Problems in Compact Memory”, under submission.

- J2 Shay Kutten, Ron Lavi and Amitabh Trehan, “Composition Games for Distributed Systems: The EU Grants Games”, under submission
- J3 Rafat Alshorman, Ra’ed Bani-Abdelrahman, Walter Hussak, Amitabh Trehan, “Specification of Synchronous Network Flooding in Temporal Logic”, under review
- J4 Armando Castaneda, Danny Dolev and Amitabh Trehan, “Compact Routing Messages in Self-Healing Trees”, *Theoretical Computer Science (TCS)*, Vol. 709, 2018. (C: 1)
- J5 Gopal Pandurangan, Peter Robinson, and Amitabh Trehan, “DEX: Self-healing Expanders”, *Distributed Computing*, Vol 29, No.3, June 2016. (C: 21)
- J6 Shay Kutten, Gopal Pandurangan, David Peleg, Peter Robinson, and Amitabh Trehan, “On the Complexity of Universal Leader Election”, *Journal of ACM (JACM)*, Vol 62, No. 2, May 2015. (C: 26)
- J7 Shay Kutten, Gopal Pandurangan, David Peleg, Peter Robinson, and Amitabh Trehan, “Sublinear Bounds for Randomized Leader Election”, *Theoretical Computer Science (TCS)*, Vol 561, January 2015 (C: 31)
- J8 Gopal Pandurangan and Amitabh Trehan, “Xheal: localized self-healing using expanders”, *Distributed Computing*, June 2013 (Online); Springer, Vol 27, No 1, February 2014 (Published) (C: 44)
- J9 Tom Hayes, Jared Saia and Amitabh Trehan, “The Forgiving Graph: A Self-Healing Distributed Data Structure”, *Distributed Computing*, Springer, Vol 25, No 4, February 2012 (C: 62)

## Conferences and Workshops

- C1 Seth Gilbert, Gopal Pandurangan, Peter Robinson, Amitabh Trehan, “DConstructor: Network Construction with Polylogarithmic Overhead”, under submission
- C2 Daniel Playfair, Amitabh Trehan, Barry McLarnon, Dimitrios S. Nikolopoulos, “Big data availability: partial checkpointing for in-memory database queries”, *Fourth Workshop on Scalable Cloud Data Management, IEEE Big Data* 2016.
- C3 Armando Castaneda, Danny Dolev and Amitabh Trehan, “Compact Routing Messages in Self-Healing Trees”, **Best paper session**, *International Conference on Distributed Computing and Networking (ICDCN)* 2016. (A: 41%) (C: 1)
- C4 Gregory Chockler and Amitabh Trehan, “Towards Self-healing SDN”, *Distributed Software Defined Networks (DSDN) workshop*, Principles of Distributed Computing (PODC), 2014
- C5 Gopal Pandurangan, Peter Robinson, and Amitabh Trehan, “DEX: Self-healing Expanders”, *IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, 2014. (C: 21, A: 21.1%)
- C6 Shay Kutten, Gopal Pandurangan, David Peleg, Peter Robinson, and Amitabh Trehan, “On the Complexity of Universal Leader Election”, in *Principles of Distributed Computing (PODC)*, 2013. (C: 26, A: 25.5%)
- C7 Shay Kutten, Ron Lavi and Amitabh Trehan, “Composition Games for Distributed Systems: The EU Grants Games”, in *AAAI Conference on Artificial Intelligence (AAAI-13)*, 2013. **Work supported by Technion-Microsoft Electronic Commerce Research Center** (C: 5, A: 29%)
- C8 Shay Kutten, Gopal Pandurangan, David Peleg, Peter Robinson, and Amitabh Trehan, “Sublinear Bounds for Randomized Leader Election”, in *International Conference on Distributed Computing and Networking (ICDCN)*, 2013. **Best paper award at ICDCN 2013** (C: 31, A: 26.8%)
- C9 Atish Das Sarma, Ashwin Lall, Danupon Nanangkoi, and Amitabh Trehan, “Dense Subgraphs on Dynamic Networks”, in *International Symposium on Distributed Computing (DISC)*, 2012. (C:6, A: 22.7%)

- C10 Ashwin Lall, Danupon Nanangkoi, Atish Das Sarma, and Amitabh Trehan, “Brief Announcement: Distributed Algorithms for finding Dense Subgraphs”, in *Principles of Distributed Computing (PODC)*, 2012. (C:1, A: 43%)
- C11 Atish Das Sarma and Amitabh Trehan, “Edge-preserving self-healing: keeping network backbones densely connected”, in *Workshop on Network Science for Communication Networks (NetSCiCom 2012)*, IEEE InfoComm, 2012 (C:16)
- C12 Gopal Pandurangan and Amitabh Trehan, “Xheal: localized self-healing using expanders”, in *Principles of Distributed Computing (PODC)*, 2011. (C: 44, A: 26.4%)
- C13 Valerie King, Steven Lonargan, Jared Saia and Amitabh Trehan, “Load balanced Scalable Byzantine Agreement through Quorum Building, with Full Information”, in *International Conference on Distributed Computing and Networking (ICDCN)*, 2011. (C: 47, A: 22.1%)
- C14 Tom Hayes, Jared Saia and Amitabh Trehan, “The Forgiving Graph: A Self-Healing Distributed Data Structure”, in *Principles of Distributed Computing (PODC)*, 2009. (C: 62, A: 24.5%)
- C15 Tom Hayes, Navin Rustagi, Jared Saia and Amitabh Trehan, “The Forgiving Tree: A Self-Healing Distributed Data Structure”, in *Principles of Distributed Computing (PODC)*, 2008. (C: 35, A: 45%)
- C16 Jared Saia and Amitabh Trehan, “Picking up the Pieces: Self-Healing in Reconfigurable Networks”, in *IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, 2008. (C: 50, A: 25.6%)
- C17 Wagish Shukla and Amitabh Trehan, “Typesetting in Devanagari, Persian and Arabic: A beginner’s experience” *TEX Users Group (TUG)*, 2002.

## Dissertation and Thesis

- D1 “Algorithms for Self-healing in Networks”, Ph.D. Dissertation, University of New Mexico, 2010. (C:24)
- D2 “A Proposal for a Phonetic Based Encoding for Indic Scripts”, M.Tech. Thesis, Mathematics, Indian Institute of Technology, Delhi, India, 2002.
- D3 “Neural Networks and Fuzzy Logic”, M.C.A. Thesis, Indira Gandhi National Open University, Delhi, 1999.

## Books, Book Chapters and Reports

- B1 Posco Tso, Amitabh Trehan, Iain Phillips and Lin Cui (Editors), ”Proceedings of the 2018 Workshop on Theory and Practice for Integrated Cloud, Fog and Edge Computing Paradigms, TOPIC@PODC 2018, Egham, United Kingdom, July 27, 2018”
- B2 Amitabh Trehan, ”Report on BCTCS 2016”, Bulletin of the EATCS 119, 2016
- B3 Amitabh Trehan, “Algorithms for self-healing in networks”, ISBN 9781243761774, Proquest, Umi Dissertation Publishing, 2011 (C:24)
- B4 Amitabh Trehan, “Self-healing systems and virtual structures”, at <http://arxiv.org/abs/1202.2466> (C: 6)
- B5 Amitabh Trehan, “Input/Output Technologies”, chapter in course text book (Computer Science), Indira Gandhi National Open University, 2003.

## Supervision

Dr. Jonas Lefevre (postdoc on the COSHER EPSRC project), Sep 2017 - Aug 2018

Gary Bennett, PhD., LU, Oct 2017 -

Ra'ed Bani Abdelrahman, PhD. (co-supervised with Walter Hussak), LU, Oct 2017 -

Daniel Playfair, Ph.D. (co-supervised with Dimitris Nikolopoulos), QUB, Oct 2013 -

Shaul Cemel, M.S. (with Shay Kutten) Technion, Jan 2012 - Nov 2015

Project/Thesis Supervision: Fifteen B.Eng./M.Eng., Eight MSc students, 2014-

Vivek Goyal, Summer Intern (with Jared Saia), UNM, May- July, 2009

## Departmental Service

*Committee member*, International Staff Group, Loughborough University, 2018 -

*Part-C/D Tutor (UG projects coordinator)*, Computer Science, Loughborough University, 2017 -

*Founder and Organiser: CDSSAS seminar series*, 2016; *QUB-TCS-Algo-Maths* and *QUB-GameTheory-SocialComputing* seminar series.

*School Champion/Partner for India (research and education), EEECS internationalisation committee*: To lead initiatives on improving the School recruitment and internationalisation in India.

*Examinations Officer CS/EEE (Support)*: To support examinations across CS and EEE departments.

*Cluster Leader of Graduate Education*: Leader for cluster (High Performance and Distributed Computing) initiatives on graduate education

*Leader of cluster UG/PG curriculum reorganisation*: QUB is changing to a major academic year restructuring for 2016-17. My role is to coordinate development of a cutting-edge curriculum.

*Member, EEECS Investors in People (IiP) Business Improvement Team*: EEECS is the first school in QUB to achieve the *Investors in People* status. Also, member of the *Knowledge Sharing subgroup*.

*Member, EEECS Research Society*: The Research Society leads many initiatives and events bringing researchers and students together.

## Professional Service

*Workshops Chair*, Principles of Distributed Computing (PODC) 2018

*Workshop Co-Chair*, Theory and Practice for Integrated Cloud, Fog and Edge Computing Paradigms - TOPIC 2018 (collocated with PODC 2018)

*Chief Organiser*, 32nd British Colloquium of Theoretical Computer Science (BCTCS) 2016

*Program Committee member*, Principles of Distributed Computing (PODC) 2019, International Conference on Distributed Computing and Networking (ICDCN) 2019, 2016, International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS) 2018, International Conference on Distributed

Computing Systems (ICDCS) 2018, 2017, International Conference on Contemporary Computing (IC3) 2017, 14th International Symposium on Pervasive Systems, Algorithms, and Networks (I-SPAN) 2017, Workshop on Foundations of Mobile Computing (FOMC) 2013, 2014

*Publicity Chair*, Workshop on Foundations of Mobile Computing (FOMC) 2014

*Organizing Committee member*, T<sub>E</sub>X Users Group (TUG2002) Conference, 2002

*Board member*, T<sub>E</sub>X users group, India. (Head of Delhi chapter) (2002 - )

*Chief organizer*: “Caturanga 2002”, Trivandrum, India, “Caturanga 2001”, Pune, India. (International conferences on interdisciplinary research).

**Fellow**: UK Higher Education Academy, *Member*: ACM, IEEE, SIAM, BCS

I have reviewed manuscripts for the following conferences/journals: *ACM TALG (2018)*, *Information Processing Letters (2017)*, *Theoretical Computer Science(2016)*, *Distributed Computing (2014, 2013)*, *Journal of Self-Computing(2013)*, *SODA(2018, 2016, 2012)*, *LATIN (2018)*, *ICDCS (2018, 2015)*, *STOC(2017, 2012)*, *IEEE IPDPS (2017,2010)*, *IC-3 (2017)* , *IEEE ICDCN (2017,2016, 2011, 2009)*, *I-SPAN (2017)*, *ICALP(2016)*, *SPAA (2015, 2011, 2010, 2009)*, *FOMC(2014, 2013)*, *SRDS (2013)*, *DISC (2011)*, *OPODIS (2013, 2010)*, *SAGT(2011)*, *CCC (2010)*, *IEEE Globecom (2009)*

Examiner/Course Writer: BCA/ADCA courses, Indira Gandhi National Open University, 2003

## Invited Presentations (Besides Conference Presentations)

Lectures on Distributed Algorithms (4 lectures), Parametrised Algorithms Group, Computer Science, University of Bergen, Oct 2-6, 2017

“COSHER: Compact Self-healing Algorithms”, Computer Science Seminar, Loughborough University, March 2017, CS Department Seminar, Royal Holloway Univ of London, Nov 2017

“Compact Routing Messages in Self-Healing Trees”, *Highlights of Algorithms (HALG 2016)*, Paris, June 2016, Indian Institute of Science Bangalore (IISc), Chennai Mathematical Institute (CMI), Indian Institute of Technology Madras (IITM), K R Mangalam University, Jan 2016; Computer Science, University of Liverpool, Nov 2015.

Resilient Low Memory Networks: Self-healing plus Compact Routing, **Keynote talk**, CONFLUENCE 2016, Amity University, Noida, India.

“Algorithms for Self-healing Networks: Forgiving Graph and Xheal”, *Institute of Maths, UNAM, Mexico, Aug 2016*, *Haifa University CS Colloquim* June 2012, University of New Mexico CS Colloquim April 2012; Indraprastha Institute of Information Technology (IIITD), Indian Institute of Technology Ropar(IITRpr), Indian Institute of Technology Delhi (IITD), Chennai Mathematical Institute (CMI), Indian Institute of Technology Madras (IITM), National University of Singapore (NUS), March 2012; Ben Gurion University, Beer-Sheva, Israel, Jan. 2012; Technion, *Computer Science Theory Seminar*, Dec. 2011.

“Distributed Computing under the Forgiving Tree”, QUB-TCS-Algo-Maths Seminar, Aug 2015.

“Composition Games for distributed systems: EU Grant games”, March 2015; *QUMS Economics Seminar*, Queen’s University Belfast, March 2014; *HPDC Seminar*, Queen’s University Belfast, March 2014; *Computer Science Seminar*, University of Victoria, July 2013; *DANSS Seminar*, Computer Science, HUJI, May 2013; *Technion-Microsoft EC center*, Technion, May 2012; University of New Mexico CS Theory Group Seminar, April 2012; *Electronic Commerce Seminar*, Technion, faculty of IE & M, Jan. 2012.

"Elections 2013: Sublinear and Universal Leader Elections", *CE Club Seminar*, Technion, Jan 2014.

"Networks that fix themselves aka Self-healing networks", *HPDC Seminar*, Queen's University Belfast, Dec 2013; *Theory Seminar*, Microsoft Research, Mountain view, CA, July 2013; *DANSS Seminar*, Computer Science, HUJI, May 2013; *Foundations of Computer Science seminar*, Weizmann Institute of Science, March 2013; *Computer Science Seminar*, Royal Holloway College, University of London, March 2013; Tata Institute of Fundamental Research, Mumbai, Nov 2012; Tel Aviv University Algorithms seminar, Oct, 2012.

"Algorithms for self-healing in networks", University of Victoria, June 2010.

"The Forgiving Tree: towards self-healing networks", Università di Roma Sapienza, March 2009, University College, London, SSE Seminar, Dec 2008.

## Press Coverage

"Researchers work towards self healing computer networks", in *UNM Today*, print ed., Aug 2008.

## Other Activities

Actor's voice, *BBC Panorama*, "Rolls Royce", 2016

Radio show host, "The International Hour", Technion Radio, Oct 2011- Feb 2012

President, UNM Cricket Club: Got the University to build a cricket pitch and provide cricket facilities by engaging the university administration at the highest level.

President, India Students Association at UNM: Organized a performance by Indian rock band 'Indian Ocean' in three weeks from conception, fund raising to execution.

Interests in Sports (Cricket (league player), Tennis etc); Creative writing (published poetry), Photography and Music.