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Education

2008 PhD, Research School of Information Sciences and Engineering, The Australian National University

- Supervisors: Dr. Jochen Trumpf, Dr. Uwe Zimmer and Prof. Rodney Kennedy.

2003: BE (First Class Honors), Computer Systems Engineering, The University of Auckland

2001: BSc, Physics, The University of Auckland

Relevant Academic Experience

Nov 2007 - Present: Research Associate in Quantum Control, School of Engineering and Information Technology, the University of New South Wales at the Australian Defence Force Academy.

- Lyapunov techniques to examine the stability of nonlinear quantum stochastic differential equations.
- Small-gain theorems for quantum feedback systems.
- Control of non-linear (open) quantum systems.
- Studying quantum probability spaces and quantum filtering.

Aug 2004 - Nov 2007: PhD Candidate, Research School of Information Sciences and Engineering, The Australian National University.

- Uncertainty principles for signal energy concentration.
- Developed abstract Banach space models to describe wireless communication channels.
- Bounds on the performance of MIMO communication system using spatial channels.

Apr 2000 - Jun 2006: Tutor/Lab Demonstrator, University of Auckland and the Australian National University.

- Demonstrated labs and tutored several undergraduate courses in Physics and Engineering Departments.

Awards, Scholarships and Grants

National ICT Australia PhD Scholarship	2004-2007
National ICT Australia Supplementary Scholarship	2004-2007
ACoRN Travel Grant	April 2006
NZ Aluminium Smelters Undergraduate Prize in Engineering	2004
Senior prize (Physics, Engineering), The University of Auckland	2000, 2001, 2003
Dean's List (Computer Systems, EEE), The University of Auckland	2001, 2003
Summer Scholarship (Engineering), The Australian National University	Dec 2002
Summer Scholarship (Physics), The University of Auckland	Dec 2001
Woolf Fisher Scholarship	1999 - 2001

Publications

Journal Papers

- Ram Somaraju and Ian Petersen. Lyapunov stability for Quantum Markov Processes, Submitted to *IEEE Transactions on Automatic Control*.
[Preprint: <http://seal.itee.adfa.edu.au/~s3245912/TAC.pdf>]
- R. Somaraju and J. Trumpf. Essential Dimension and Degrees of Freedom. *IEEE Transactions on Information Theory*, accepted for publication.
[Preprint: arXiv:0901.1694v1]
- R. Somaraju and J. Trumpf. Frequency, temperature and salinity variation of the permittivity of sea-water. *IEEE Transactions on Antennas and Propagation*, 54(11):3441-3448, 2006.
- R. Somaraju and F. Schill, A communication module and TDMA scheduling for a swarm of small submarines. *Turkish Journal of Electrical Engineering & Computer Sciences*, 15(2): 2007.

Conferences and Workshops

- Ram Somaraju and Ian Petersen. Feedback Interconnections of Open Quantum Systems: A small gain theorem. IEEE Conference on Decision and Control, Shanghai, December 16 - 18, 2009, Accepted for publication.
- Ram Somaraju and Ian Petersen. Lyapunov stability of quantum Markov processes. In Proceedings of the American Control Conference, St. Louis, Missouri, USA, pp 719 - 724, , June 10 - 12, 2009.
- R. Somaraju and J. Trumpf. Generalised Singular Values. The XIXth International Workshop on Operator Theory and Applications, July 22-26, 2008.
- R. Somaraju, and L. W. Hanlen, Uncertainty principles for signal concentrations, *Proceedings. 7th Australian Communications Theory Workshop*, 2006., pp. 38- 42, 1-3 Feb. 2006.
- Clark Thomborson and Jasvir Nagra and Ram Somaraju and Charles He. Tamper-proofing software watermarks. *ACSW Frontiers '04: Proceedings of the second workshop on Australasian information security, Data Mining and Web Intelligence, and Software Internationalisation*. Dunedin, New Zealand. pages 27-36, 2004.

Patents

- Tamper-proofing watermarked computer programs, US Patent Application 2005/0050396A1, by Clark Thomborson, Yong He, Ram Somaraju, and Jasvir Nagra, assigned to Auckland UniServices Ltd, 14 pp., 13 claims, filed 20 May 2004, published 3 March 2005.

Thesis and Projects

Essential Dimension and Uncertainty Principle for Spatial Channels. PhD Thesis, Australian National University (2004 - 2007)

This thesis aims to find fundamental, information theoretic, limits for Multiple Input Multiple Output (MIMO) communication systems.

Underwater Communication Module, Australian Institute of Sport (2006)

Designed a communication module to transmit Bio-data for swimmers at the Australian Institute of Sport (AIS).

Modelling and Control of a single Flexible Beam. Final Year Project, University of Auckland (2003)

This one year project involved designing a controller for a flexible beam.

Referees

Prof. Ian Petersen

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Dr. Jochen Trumpf (PhD Supervisor)

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A/Prof. Massimo Franceschetti (PhD Examiner)

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