CHANDRASEKHAR MADHAVAN NAIR
(CHANDRA NAIR)

Dept. of Information Engineering
The Chinese University of Hong Kong
email: cnair@ie.cuhk.edu.hk
URL: http://chandra.ie.cuhk.edu.hk
Phone: +852-9854-6864

## Current position

*Assistant Professor*, Department of Information Engineering (IE)
*Associate Director*, Institute of Theoretical Computer Science and Communication (ITCSC)

## Research interests

Network information theory, discrete optimization, network algorithms, probability, combinatorics

## Work Experience

| | |
|---|---|
| 2004 | Research Intern, Microsoft Research (Theory Group), Redmond, USA |
| 2005-2007 | Post-doctoral Researcher, Microsoft Research (Theory Group), Redmond, USA |
| 2007- | Assistant Professor, Department of Information Engineering, CUHK, Hong Kong |

## Education

| | |
|---|---|
| 1995-1999 | Nurture Programme in Mathematics, Institute of Mathematical Sciences, Madras, India |
| 1995-1999 | B.Tech in Electrical Engineering, Indian Institute of Technology, Madras, India |
| 1999-2002 | M.S. in Electrical Engineering, Stanford University, Stanford, USA |
| 2000-2005 | PhD in Electrical Engineering, Stanford University, Stanford, USA |

## Honors & awards

| | |
|---|---|
| 1994 | *First*, Indian National Mathematics Olympiad |
| 1994-1999 | National Talent Scholarship, Government of India |
| 1995-1999 | *First*, EE dept, I.I.T. Madras |
| 1999 | Siemens(India) and Phillips(India) prize for best academic record (EE dept, class of 99) |
| 2000-2004 | Stanford Graduate Fellowship |
| 2004-2005 | Microsoft Graduate Fellowship |

## Teaching

| | |
|---|---|
| Fall '07 | Basic Circuit Theory |
| Fall '08, '11 | Multiuser Information Theory* |
| Fall '09,'11,'12 | Signals and Systems |
| Spring '10 | Theory of Probability* |
| Fall '10 | Signals and Systems - regular *&* elite* |
| Fall '10 | Random Processes* |
| Fall '11,'12 | Advanced Engineering Mathematics |

*-indicates new courses

## PhD Thesis

Proofs of the Parisi and Coppersmith-Sorkin conjectures in the finite random assignment problem, June 2005, Stanford University.

## List of Publications

## Journal

[1] C. Nair, B. Prabhakar, and M. Sharma, "Proofs of the Parisi and Coppersmith-Sorkin random assignment conjectures," *Random Structures and Algorithms*, vol. 27(4), pp. 413–444, 2005.

[2] C. Nair and A. El Gamal, "The capacity of a class of 3-receiver broadcast channels with degraded message sets," *International Symposium on Information Theory*, pp. 1706–1710, 2008.

[3] C. Nair and A. El Gamal, "The capacity region of a class of three-receiver broadcast channels with degraded message sets," *Information Theory, IEEE Transactions on*, vol. 55, pp. 4479–4493, Oct. 2009.

[4] C. Borgs, J. T. Chayes, S. Mertens, and C. Nair, "Proof of the local rem conjecture for number partitioning I: Constant energy scales," *Random Structures and Algorithms*, vol. 34(2), pp. 217–240, 2009.

[5] C. Borgs, J. T. Chayes, S. Mertens, and C. Nair, "Proof of the local rem conjecture for number partitioning II: Growing energy scales," *Random Structures and Algorithms*, vol. 34(2), pp. 241–284, 2009.

[6] C. Nair, "Capacity regions of two new classes of two-receiver broadcast channels," *Information Theory, IEEE Transactions on*, vol. 56, pp. 4207–4214, sep. 2010.

[7] C. Nair and Z. Wang, "The capacity region of the three receiver less noisy broadcast channel," *Information Theory, IEEE Transactions on*, vol. 57, pp. 4058 –4062, july 2011.

[8] Y. Geng, V. Jog, C. Nair, and Z. V. Wang, "An information inequality and evaluation of marton's inner bound for binary input broadcast channel," *IEEE Trans. Info. Theory (accepted)*.

## Conference papers (invited and unrefereed)

[9] C. Nair, B. Prabhakar, and D. Shah, "The randomness in randomized load balancing," *Proceedings of the 39th Annual Allerton Conference on Communication, Control and Computing*, pp. 912–921, 2001.

[10] C. Nair and Z. V. Wang, "On the inner and outer bounds for 2-receiver discrete memoryless broadcast channels," *Proceedings of the ITA Workshop*, 2008.

[11] C. Nair, "An achievable rate region for the 2-receiver broadcast channel obtained by viewing it as an interference channel," in *International Conference on Wireless Communications & Signal Processing*, (Nanjing, P.R. China), 2009.

[12] V. Jog and C. Nair, "An information inequality for the bssc channel," *Proceedings of the ITA Workshop*, 2010.

[13] Y. Geng, A. Gohari, C. Nair, and Y. Yu, "On Marton's inner bound for two receiver broadcast channels," *Presented at ITA Workshop*, 2011.

[14] M. H. M. Costa and C. Nair, "On the achievable rate sum for symmetric gaussian interference channels," *ITA Workshop*, 2012.

## Conference papers (refereed)

[15] R. Pan, C. Nair, B. Prabhakar, and B. Yang, "Packet dropping schemes: some examples and analysis," *Proceedings of the 39th Annual Allerton Conference on Communication, Control and Computing*, pp. 563–572, 2001.

[16] A. El Gamal, C. Nair, B. Prabhakar, E. Uysal, and S. Zahedi, "Energy-efficient scheduling of packet transmissions over wireless networks," *Proceedings of the IEEE Infocom Conference*, vol. 3, pp. 1773–1782, June, 2002.

[17] C. Nair, "Towards the resolution of Coppersmith-Sorkin conjectures," *Proceedings of the 40th Annual Allerton Conference on Communication, Control and Computing*, pp. 667–673, 2002.

[18] C. Nair, B. Prabhakar, and M. Sharma, "Proofs of the Parisi and Coppersmith-Sorkin conjectures for the finite random assignment problem," *IEEE Foundations of Computer Science (FOCS)*, pp. 168–178, 2003.

[19] C. Nair, E. Ordentlich, and T. Weissman, "Asymptotic filtering and entropy rate of a hidden Markov process in the rare transitions regime," *International Symposium on Information Theory*, pp. 1838–1842, 2005.

[20] C. Nair and A. El Gamal, "An outer bound to the capacity region of the broadcast channel," *International Symposium on Information Theory*, pp. 2205–2209, 2006.

[21] N. J. A. Harvey, K. Jain, L. C. Lau, C. Nair, and Y. Wu, "Conservative network coding," *Proceedings of the 44th Annual Allerton Conference on Communication, Control and Computing*, 2006.

[22] M. Bayati and C. Nair, "A rigorous proof of the cavity method for counting matchings," *Proceedings of the 44th Annual Allerton Conference on Communication, Control and Computing*, 2006.

[23] M. Bayati, D. Gamarnik, D. Katz, C. Nair, and P. Tetali, "Simple deterministic approximation algorithms for counting matchings," *Proceedings of the Symposium on Theory of Computation(STOC)*, pp. 122–127, 2007.

[24] N. J. A. Harvey, R. Klienberg, C. Nair, and Y. Wu, "A 'chicken & egg ' network coding problem," *Proceedings of the International symposium on Information Theory*, 2007.

[25] C. Nair and Z. V. Wang, "On the inner and outer bounds of 3-receiver broadcast channels with 2-degraded message sets," *International Symposium on Information Theory*, pp. 1844–1848, 2009.

[26] C. Nair, "Capacity regions of two new classes of 2-receiver broadcast channels," *International Symposium on Information Theory*, pp. 1839–1843, 2009.

[27] G. Kramer and C. Nair, "Comments on: Broadcast channels with arbitrarily correlated sources," *International Symposium on Information Theory*, pp. 2777–2779, 2009.

[28] Y. Geng, C. Nair, S. Shamai, and Z. V. Wang, "On broadcast channels with binary inputs and symmetric outputs," *International Symposium on Information Theory*, 2010.

[29] C. Nair and Z. V. Wang, "The capacity region of a class of broadcast channels with a sequence of less noisy receivers," *International Symposium on Information Theory*, 2010.

[30] C. Nair, Z. V. Wang, and Y. Geng, "An information inequality and evaluation of Marton's inner bound for binary input broadcast channels," *International Symposium on Information Theory*, 2010.

[31] Y. Geng, A. Gohari, C. Nair, and Y. Yu, "The capacity region of classes of product broadcast channels," *Proceedings of IEEE International Symposium on Information Theory*, pp. 1549–1553, 2011.

[32] Y. Geng and C. Nair, "The capacity region of the two-receiver vector gaussian broadcast channel with private and common messages," in *2012 IEEE International Symposium on Information Theory (ISIT'2012)*, (Cambridge, Massachusetts, USA), pp. 591–595, July 2012.

[33] C. Nair and L. Xia, "On Three-Receiver more capable channels," in *2012 IEEE International Symposium on Information Theory (ISIT'2012)*, (Cambridge, Massachusetts, USA), pp. 383–387, July 2012.

[34] A. A. Gohari, C. Nair, and V. Anantharam, "On marton's inner bound for broadcast channels," in *2012 IEEE International Symposium on Information Theory (ISIT'2012)*, (Cambridge, Massachusetts, USA), pp. 586–590, July 2012.

## Uploads to arXiv (unrefereed)

[35] C. Nair, A. El Gamal, and Y.-K. Chia, "An achievability scheme for the compound channel with state noncausally available at the encoder," *CoRR*, vol. abs/1004.3427, 2010.

[36] C. Nair, "A note on outer bounds for broadcast channel," *Presented at International Zurich Seminar*, 2010.

## Invited talks at universities (2008-2012)

1. Stanford - Jan 2008, February 2012
2. HKUST - April 2008, February 2010
3. ETH, Zurich - May 2008
4. University of California, San Diego - February 2009, April 2012
5. Caltech - February 2009
6. EPFL, Lausanne - March 2009
7. Indian Institute of Science - January 2010
8. Indian Institute of Technology - January 2010
9. City U - January 2010
10. Massachusetts Institute of Technology - June 2010
11. University of Southern California - January 2011
12. University of California, Berkeley - February 2012

## Miscellaneous

Services to Conferences

- Technical Program Committee
    - Information Theory Workshops (ITW): Cairo - 2010, Paraty - October 2011
    - International Symposiums on Information Theory (ISIT): St. Petersburg - 2011, Boston - 2012, Istanbul - 2013
- Conference Organization
    - Broadcast channel summit - CUHK, March 2010
- List (partial) of conferences for which I have served as reviewer
    - International Symposium on Information Theory (ISIT)
    - Information Theory Workshop (ITW)
    - Foundations of Computer Science (FOCS)
    - Symposium on Theory of Computation (STOC)

## Services to Journals

- List (partial) of journals for which I have served as reviewer
    - IEEE Transactions on Information Theory
    - IEEE Transactions on Networking
    - Random Structures and Algorithms
    - Annals of Applied Probability