Niranjan Nayak Ratnakar

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EDUCATION

Ph.D. in Electrical and Computer Engineering — *Expected graduation: August 2006*
University of Illinois at Urbana-Champaign
GPA : 4.0/4.0 — **Advisor :** Prof. Ralf Koetter

Master of Science (M.S.) in Electrical and Computer Engineering — *October 2003*
University of Illinois at Urbana-Champaign
GPA : 4.0/4.0 — **Advisor :** Prof. Ralf Koetter

Bachelor of Technology (B.Tech.) in Electrical Engineering. — *July 2001*
Indian Institute of Technology - Madras, Chennai, India
GPA : 9.17/10 — **Rank :** 2 among a graduating class of 91

EXPERIENCE AND PROJECTS

1. **Research Assistant** (Advisor: Prof. Ralf Koetter) , *University of Illinois, August 2001 - Present.*
   - Designed a network coding scheme for multiple unicasts in networks using linear programming. In order to evaluate the proposed code, I simulated a network-coded system in C.
   - Proposed and evaluated (via simulations in C) a decentralized algorithm to achieve minimum-cost multicast using network coding.
   - Proposed analytical upper bounds on the performance of Algebraic Soft Decision (ASD) decoding algorithm for Reed-Solomon codes. Used the upper bounds to optimize the parameters of the ASD algorithm. Performed extensive simulations in C to demonstrate the tightness of the proposed bounds.
2. **Summer Intern** , *NEC Labs, Princeton, NJ, 2005.*
   - Investigated the application of network coding to the problem of distributed data storage.
3. **Summer Intern** (Advisor: Dr. Gerhard Kramer) , *Bell Labs, Lucent Technologies, Murray Hill, NJ, 2004.*
   - Characterized the multicast capacity of deterministic relay networks with no interference.
   - Proved the sub-optimality of separation between network coding and channel coding for the same networks as above.
4. **Summer Intern**, *IBM Research Labs, New Delhi, 2000.*
   - Contributed to the implementation of an advanced fingerprint identification system.

SELECTED COURSE WORK

Communications - II, Wireless Communication I, Wireless Communication II, Digital Signal Processing, Coding Theory, Advanced Coding Theory

PUBLICATIONS

Journal

1. N. Ratnakar, G. Kramer,"On the Achievability of the Multicast Capacity of Acyclic, Deterministic Relay Networks with No Interference" *IEEE Transactions on Information Theory*, 52(6), pp 2425-2432, Jun. 2006.
2. D. S. Lun, N. Ratnakar, M. Medard, R. Koetter, D. R. Karger, T. Ho, and E. Ahmed, "Minimum-Cost Multicast over Coded Packet Networks" *IEEE Transactions on Information Theory*, 52(6), pp 2608 - 2623, Jun. 2006.
3. N. Ratnakar, R. Koetter, "Exponential Error Bounds for Algebraic Soft-Decision Decoding of Reed Solomon Codes", *IEEE Transactions on Information Theory*, 51(11), pp 3899-3917, Nov. 2005.

Conference

1. D. Traskov, N. Ratnakar, D. S. Lun, R. Koetter, and M. Medard,"Network Coding for Multiple Unicasts: An Approach based on Linear Optimization" submitted to *Intl. Symposium on Information Thy., Seattle, 2006*
2. N. Ratnakar, D. Traskov, R. Koetter,"Approaches to Network Coding for Multiple Unicasts" *Proc. of Intl. Zurich Seminar on Communications, Zurich, 2006*
3. N. Ratnakar, G. Kramer,"On the Separation of Channel and Network Coding in Aref Networks" *Proc. of Intl. Symposium on Information Thy., Adelaide, Australia, 2005*
4. K. Bhattad, N. Ratnakar, R. Koetter, K. Narayanan, "Minimal Network Coding for Multicast" *Proc. of Intl. Symposium on Information Thy., Adelaide, Australia, 2005*
5. S. Deb, M. Effros, T. Ho, D. R. Karger, R. Koetter, D. S. Lun, M. Medard, and N. Ratnakar, "Network Coding for Wireless Applications: A Brief Tutorial" *Proc. Intl. Workshop on Wireless Ad-hoc Networks (IWWAN), May 2005*
6. N. Ratnakar, G. Kramer, "The Multicast Capacity of Acyclic, Deterministic, Relay Networks with no Interference" *Proceedings of NetCod, Riva Del Garda, Italy, 2005*
7. D. S. Lun, N. Ratnakar, R. Koetter, M. Medard, E. Ahmed, and H. Lee, "Achieving Minimum-Cost Multicast: A Decentralized Approach Based on Network Coding" *Proc. of INFOCOM, Miami, 2005*
8. N. Ratnakar, R. Koetter, "Exponential Error Bounds for Algebraic Soft-Decision Decoding of Reed Solomon Codes", *Proc. of Intl. Symposium on Information Thy., Chicago, 2004*
9. N. Ratnakar, R. Koetter, "A Chernoff type error bound for Algebraic Soft-Decision Decoding of Reed Solomon codes", *Proc. of the Thirty-Sixth Asilomar Conference on Signals, Systems and Computers,* Aug. 2002

HONORS

- Received the Motorola Fellowship (for excellence in research in the field of communications) for 2005-2006.
- Received the Vodafone Fellowship (for excellence in research in the field of wireless research) for 2003-2005.
- Ranked 2/91 in the graduating class of 2001 at IIT-Madras.
- Ranked in top 0.4 % in the Indian Institute of Technology - Joint Entrance Exam (IIT-JEE).

MISCELLANEOUS

- Computer Skills: C, Mathematica, Matlab, Scilab, LaTeX
- Branch Councilor, Electrical Engineering at Indian Institute of Technology-Madras July-2000 to May-2001
- Representative of Students Council at Indian Institute of Technology-Madras July-2000 to May-2001
- Citizenship and current visa status: Indian ; F1 (Student)
