

# Ankit Singh Rawat

Postdoctoral Associate  
Electrical Engineering and Computer Science  
Massachusetts Institute of Technology

77 Massachusetts Ave, Room 36-673  
Cambridge, MA, 02139  
Phone: (512)-574-0627  
<http://web.mit.edu/asrawat/www/>

## EDUCATION

---

### The University of Texas at Austin

M.S./Ph.D. in Electrical and Computer Engineering

**Dissertation:** New Coding Techniques for Distributed Storage Systems

**Research Advisor:** Prof. Sriram Vishwanath

**Thesis Committee:** Prof. Sriram Vishwanath, Prof. François Baccelli, Prof. Alexandros G. Dimakis, Prof. Arya Mazumdar, Prof. David Zuckerman

Austin, TX  
Fall 2010 – Summer 2015

### Indian Institute of Technology

Bachelor of Technology in Electrical Engineering

Departmental Rank: 2

Kanpur, India  
Fall 2006 – Spring 2010

## RESEARCH INTERESTS

---

Coding for Distributed Storage Systems, Statistical Machine Learning, Information Theory, Security and Privacy, Neuro-inspired Computing.

## WORK EXPERIENCE

---

### Research Laboratory of Electronics (RLE), EECS, MIT

*Postdoctoral Associate*

Host: Prof. Gregory W. Wornell

Cambridge, MA  
September 2016 – present

### CS Department, Carnegie Mellon University

*Postdoctoral Fellow*

Host: Prof. Venkatesan Guruswami

Pittsburgh, PA  
September 2015 – August 2016

### Wireless Networking and Communications Group (WNCG), UT Austin

*Graduate Research Assistant, MCD Fellow*

Advisor: Prof. Sriram Vishwanath

Austin, TX  
August 2010 – August 2015

### Alcatel Lucent Bell Labs

*Research Intern*

Mentor: Dr. Emina Soljanin

Murray Hill, NJ  
June 2013 – August 2013

### DOCOMO Innovations

*Research Engineer (Intern)*

Mentors: Dr. Haralabos C. Papadopoulos & Dr. Ozgun Y. Bursalioglu

Palo Alto, CA  
June 2012 – August 2012

### Center for Advanced Systems and Engineering (CASE), Syracuse University

*Research Intern*

Mentor: Prof. Pramod K. Varshney

Syracuse, NY  
May 2009 – July 2009

## HONORS AND AWARDS

---

**Microelectronics and Computer Development (MCD) Fellowship**, UT Austin, 2010-2011

**Sri Singhasan Singh Scholarship**, IIT Kanpur, 2008-2009

**Academic Excellence Award**, IIT Kanpur, 2006-2007 and 2007-2008

**Nita Goyal and Ashish Gupta Scholarship**, IIT Kanpur, 2006-2010

**CBSE Merit Scholarship** for securing all India rank (AIR) **159** in AIEEE 2006

## JOURNAL PUBLICATIONS

---

[J1] **A. S. Rawat**, O. O. Koyluoglu and S. Vishwanath, “Centralized Repair of Multiple Node Failures with Applications to Communication Efficient Secret Sharing,” submitted, April 2016. *Available at* ArXiv:1603.04822.

- [J2] **A. S. Rawat**, D. S. Papailiopoulos, A. G. Dimakis and S. Vishwanath, "Locality and Availability in Distributed Storage," *IEEE Transactions on Information Theory*, Vol. 62, No. 8, pp. 4481-4493, August 2016. Available at IEEE Xplore.
- [J3] **A. S. Rawat**, Z. Song, A. G. Dimakis and A. Gál, "Batch Codes through Dense Graphs with High Girth," *IEEE Transactions on Information Theory*, Vol. 62, No. 4, pp. 1592-1604, April 2016. Available at IEEE Xplore.
- [J4] **A. S. Rawat**, A. Mazumdar and S. Vishwanath, "Cooperative Local Repair in Distributed Storage," *EURASIP Journal on Advances in Signal Processing*, December 2015. Available at Springer Link.
- [J5] N. Silberstein, **A. S. Rawat** and S. Vishwanath, "Error-Correcting Regenerating and Locally Repairable Codes via Rank-Metric Codes," *IEEE Transactions on Information Theory*, Vol. 61, No. 11, pp. 5765-5778, November 2015. Available at IEEE Xplore.
- [J6] O. O. Koyluoglu, **A. S. Rawat** and S. Vishwanath, "Secure Cooperative Regenerating Codes for Distributed Storage Systems," *IEEE Transactions on Information Theory*, Vol. 60, No. 9, pp. 5228-5244, September 2014. Available at IEEE Xplore.
- [J7] **A. S. Rawat**, O. O. Koyluoglu, N. Silberstein and S. Vishwanath, "Optimal Locally Repairable and Secure Codes for Distributed Storage Systems," *IEEE Transactions on Information Theory*, Vol. 60, No. 1, pp. 212-236, January 2014. Available at IEEE Xplore.
- [J8] **A. S. Rawat**, P. Anand, H. Chen and P. K. Varshney, "Collaborative Spectrum Sensing in the Presence of Byzantine Attacks in the Cognitive Radio Networks," *IEEE Transactions on Signal Processing*, Vol. 59, No. 2, pp. 774-786, February 2011. Available at IEEE Xplore.

## REFEREED CONFERENCE PUBLICATIONS

---

- [C1] **A. S. Rawat**, I. Tamo, V. Guruswami and K. Efremenko, " $\epsilon$ -MSR Codes with Small Sub-packetization," to appear in *IEEE International Symposium on Information Theory (ISIT)*, June 2017.
- [C2] **A. S. Rawat**, "A Note on Secure Minimum Storage Regenerating Codes," to appear in *IEEE International Symposium on Information Theory (ISIT)*, June 2017. Available at ArXiv:1608.01732.
- [C3] A. Mazumdar and **A. S. Rawat**, "Associative Memory using Dictionary Learning and Expander Decoding," *Thirty-First AAAI Conference on Artificial Intelligence (AAAI)*, 2017. Available at ArXiv:1611.09621.
- [C4] V. Guruswami and **A. S. Rawat**, "New MDS codes with small sub-packetization and near-optimal repair bandwidth," *Twenty-Eighth Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2017. Available at SIAM Proceedings.
- [C5] A. Mazumdar, Y. Polyanskiy, **A. S. Rawat** and H. Roozbehani, "Distance Preserving Maps and Combinatorial Joint Source-channel Coding for Large Alphabets," *IEEE International Symposium on Information Theory (ISIT)*, 2016. Available at IEEE Xplore.
- [C6] **A. S. Rawat**, O. O. Koyluoglu and S. Vishwanath, "Centralized Repair of Multiple Node Failures," *IEEE International Symposium on Information Theory (ISIT)*, 2016. Available at IEEE Xplore.
- [C7] A. Mazumdar and **A. S. Rawat**, "Associative Memory via a Sparse Recovery Model," *Neural Information Processing Systems (NIPS)*, 2015. Available at NIPS Proceedings.
- [C8] **A. S. Rawat**, Z. Song, A. G. Dimakis and A. Gál, "Batch Codes through Dense Graphs without Short Cycles," *IEEE International Symposium on Information Theory (ISIT)*, 2015. Available at IEEE Xplore.
- [C9] A. Mazumdar and **A. S. Rawat**, "On Adversarial Joint Source Channel Coding," *IEEE International Symposium on Information Theory (ISIT)*, 2015. Available at IEEE Xplore.
- [C10] C. Hunger, M. Kazdagli, **A. S. Rawat**, A. G. Dimakis, S. Vishwanath and M. Tiwari, "Understanding Microarchitectural Channels and Using Them for Defense," *IEEE International Symposium on High Performance Computer Architecture (HPCA)*, 2015. Available at IEEE Xplore.
- [C11] **A. S. Rawat** and E. Soljanin, "Dynamic Control of Video Quality in AVS," *IEEE International Symposium on Information Theory (ISIT)*, 2014. Available at IEEE Xplore.
- [C12] **A. S. Rawat**, D. S. Papailiopoulos, A. G. Dimakis and S. Vishwanath, "Locality and Availability in Distributed Storage," *IEEE International Symposium on Information Theory (ISIT)*, 2014. Available at IEEE Xplore.
- [C13] A. Chatterjee, **A. S. Rawat**, S. Vishwanath and S. Sanghavi, "Learning the Causal Graph of Markov Time Series," *51st Annual Allerton Conference on Communication, Control, and Computing*, 2013. Available at IEEE Xplore.
- [C14] **A. S. Rawat**, O. O. Koyluoglu, N. Silberstein and S. Vishwanath, "Secure Locally Repairable Codes for Distributed Storage Systems," *IEEE International Symposium on Information Theory (ISIT)*, 2013. Available at IEEE Xplore.
- [C15] N. Silberstein, **A. S. Rawat**, O. O. Koyluoglu and S. Vishwanath, "Optimal Locally Repairable Codes via Rank-Metric Codes," *IEEE International Symposium on Information Theory (ISIT)*, 2013. Available at IEEE Xplore.

- [C16] O. O. Koyluoglu, **A. S. Rawat** and S. Vishwanath, “The Secrecy Capacity of Minimum Bandwidth Cooperative Regenerating Codes,” *IEEE International Symposium on Information Theory (ISIT)*, 2013. Available at IEEE Xplore.
- [C17] G. M. Kamath, N. Silberstein, N. Prakash, **A. S. Rawat**, V. Lalitha, O. O. Koyluoglu, P. V. Kumar and S. Vishwanath, “Explicit MBR All-Symbol Locality Codes,” *IEEE International Symposium on Information Theory (ISIT)*, 2013. Available at IEEE Xplore.
- [C18] **A. S. Rawat**, O. Y. Bursalioglu and H. C. Papadopoulos, “Scheduling Algorithms for MU-MIMO with Partial Current CSIT and Full Delayed CSIT,” *IEEE Vehicular Technology Conference (VTC)*, 2013. Available at IEEE Xplore.
- [C19] N. Silberstein, **A. S. Rawat** and S. Vishwanath, “Error Resilience in Distributed Storage via Rank-metric Codes,” *50th Annual Allerton Conference on Communication, Control, and Computing*, 2012. Available at IEEE Xplore.
- [C20] **A. S. Rawat** and S. Vishwanath, “On Locality in Distributed Storage Systems,” *IEEE Information Theory Workshop (ITW)*, 2012. Available at IEEE Xplore.
- [C21] **A. S. Rawat**, S. Vishwanath, A. Bhowmick and E. Soljanin, “Update Efficient Codes for Distributed Storage,” *IEEE International Symposium on Information Theory (ISIT)*, 2011. Available at IEEE Xplore.
- [C22] **A. S. Rawat**, P. Anand, H. Chen and P. K. Varshney, “Countering Byzantine Attacks in Cognitive Radio Network,” *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2010. Available at IEEE Xplore.
- [C23] P. Anand, **A. S. Rawat**, H. Chen and P. K. Varshney, “Collaborative Spectrum Sensing in the Presence of Byzantine Attacks in the Cognitive Radio Networks,” *International Conference on Communication Systems and Networks (COMSNETS)*, 2010. Available at IEEE Xplore.

---

## INVITED CONFERENCE PUBLICATIONS

- [I1] **A. S. Rawat**, O. O. Koyluoglu and S. Vishwanath, “Progress on High-rate MSR Codes: Enabling Arbitrary Number of Helper Nodes,” *Information Theory and Applications Workshop (ITA)*, 2016. Available at ArXiv:1601.06362.
- [I2] **A. S. Rawat**, N. Silberstein, O. O. Koyluoglu and S. Vishwanath, “Secure Distributed Storage Systems: Local Repair with Minimum Bandwidth Regeneration,” *International Symposium on Communications, Control, and Signal Processing (ISCCSP)*, 2014. Available at IEEE Xplore.
- [I3] **A. S. Rawat**, D. S. Papailiopoulos, A. G. Dimakis and S. Vishwanath, “On Codes with Availability in Distributed Storage,” *International Symposium on Communications, Control, and Signal Processing (ISCCSP)*, 2014. Available at IEEE Xplore.
- [I4] **A. S. Rawat**, A. Mazumdar and S. Vishwanath, “On Cooperative Local Repair in Distributed Storage,” *48th Annual Conference on Information Sciences and Systems (CISS)*, 2014. Available at IEEE Xplore.
- [I5] **A. S. Rawat**, D. S. Papailiopoulos, A. G. Dimakis and S. Vishwanath, “Locality and Availability in Distributed Storage,” *51st Annual Allerton Conference on Communication, Control, and Computing*, 2013.
- [I6] **A. S. Rawat**, N. Silberstein, O. O. Koyluoglu and S. Vishwanath, “Optimal Locally Repairable Codes with Local Minimum Storage Regeneration via Rank-metric Codes,” *Information Theory and Applications Workshop (ITA)*, 2013. Available at IEEE Xplore.

---

## SELECTED INVITED TALKS

- “MDS Codes with Small Sub-packetization and Near-optimal Repair Bandwidth,” The 6th Biennial Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Toronto, Canada. June 2017.
- “New Paradigms for Cloud Storage,” Department of Electrical Engineering, University of Notre Dame, South Bend, IN. March 2017.
- “New Paradigms for Cloud-based Systems,” Department of Electrical Engineering, Columbia University, New York City, NY. March 2017.
- “New Coding Techniques for Distributed Storage Systems,” Department of ECE, Texas A&M University, College Station, TX. November 2016.
- “Neural Auto-associative Memory via Sparse Recovery,” *LIDS & Stats Tea Talk*, Massachusetts Institute of Technology, Boston, MA. September 2016.
- “New Coding Techniques for Distributed Storage Systems,” *Signals, Information, and Algorithms Lab.*, EECS, Massachusetts Institute of Technology, Boston, MA. April 2016.
- “New Coding Techniques for Distributed Storage Systems,” *Theory Seminar*, College of Information and Computer Science, University of Massachusetts Amherst, Amherst, MA. April 2016.
- “New Coding Techniques for Distributed Storage Systems,” *Graduation Day, ITA*, San Diego, CA. February 2016.

- “Codes to Enable Parallel Reads in Distributed Storage Systems,” *Theory Lunch Seminar*, Computer Science Department, Carnegie Mellon University, PA. October 2015.
- “Dynamic Control of Video Quality in Adaptive Video Streaming,” BIRS Workshop on Mathematical Coding Theory for Streaming, Banff, Canada. October 2015.
- “Update and Repair Efficient Codes for Distributed Storage,” DIMACS Workshop on Algorithms for Green Data Storage, December 2013.
- “Optimal Locally Repairable Codes for Distributed Storage Systems,” Department of ECE, University of Minnesota – Twin Cities, MN. September 2013.
- “Optimal Locally Repairable Codes for Distributed Storage Systems,” *Mathematics Colloquium & Informal Seminar*, Bell Labs, NJ. August 2013.

---

## TEACHING EXPERIENCE

<i>Teaching Assistant</i> , Information Theory (EE381K-7), UT Austin Instructor: Prof. Alexandros G. Dimakis	Spring 2015
<i>Teaching Assistant</i> , Modeling of Large Wireless Networks (EE381K-5), UT Austin Instructor: Prof. François Baccelli	Spring 2013

---

## PROFESSIONAL SERVICE

**Reviewer:** IEEE Transactions on Information Theory, IEEE/ACM Transactions on Networking, ACM Transactions on Storage, IEEE Transactions on Signal Processing, IEEE Transactions on Vehicular Technology, IEEE Transactions on Communications, IEEE Journal of Selected Topics in Signal Processing, IEEE Transactions on Computers, IEEE Communications Letters, EURASIP Journal on Wireless Communications and Networking, ISIT 2017, INFOCOM 2017, NIPS 2016, ISIT 2016, ITW 2015, ISIT 2015, ITW 2014, ISIT 2014, VTC 2014, ISIT 2013, PIMRC 2013, WCNC 2013, ISIT 2012, ICC 2012, ISITA 2012, INFOCOM 2011, CROWNCOM 2011, ISIT 2011, GLOBECOM 2011, ISCC 2011, SPCOM 2010.

**Session Chair:** Information Theory and Applications Workshop (ITA), 2016.

**PC Member:** International Workshop on Distributed Storage Systems and Coding for Big Data (BigData), 2015.

---

## RELEVANT COURSES

Coding Theory, Sparsity, Structure and Algorithms, Convex Optimization: Theory and Applications, Randomized Algorithms, Learning Theory, Algorithms: Techniques and Theory, Information Theory and Statistics, Theory of Probability I & II, Probability and Stochastic Processes, Algebra I, Postmodern Coding Theory, Data Mining: A Mathematical Perspective, Space-Time Stochastics, Introduction to System Theory, Analysis and Design of Communication Networks, Wireless Communications, Universal Compression Algorithms and Entropy Rate.

---

## PROGRAMMING AND SOFTWARE SKILLS

**Languages:** C, C++, Python, Java, HTML, Assembly, MATLAB.

**Softwares:** Network Simulator (ns).

---

## REFERENCES

Prof. Gregory W. Wornell, gww@mit.edu  
 Prof. Venkatesan Guruswami, venkatg@cs.cmu.edu  
 Prof. Sriram Vishwanath, sriram@austin.utexas.edu  
 Prof. Alexandros G. Dimakis, dimakis@austin.utexas.edu  
 Prof. Emina Soljanin, emina.soljanin@rutgers.edu  
 Prof. Arya Mazumdar, arya@cs.umass.edu