

# Ankit Singh Rawat

## Curriculum Vitae

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🔗 [Google Scholar link](#), [DBLP](#)

### Research Interests

My research interests broadly lie in coding theory, statistical machine learning, information theory, and security & privacy. My research primarily focuses on enabling fast, reliable, and secure large-scale information processing; running the gamut from designing novel coding schemes for cloud storage and computing systems to developing efficient learning algorithms to extract useful structures and representations from high-dimensional data.

### Work Experience

- September 2016 – present **Postdoctoral Associate/Fellow**  
EECS Department, Massachusetts Institute of Technology, Cambridge, MA.
- September 2017 – April 2018 **Postdoctoral Research Associate**  
College of Information and Computer Sciences, University of Massachusetts, Amherst, MA.
- September 2015 – August 2016 **Postdoctoral Fellow**  
Computer Science Department, Carnegie Mellon University, Pittsburgh, PA.

### Education

- 2010–2015 **M.S./Ph.D. in Electrical and Computer Engineering**  
The University of Texas at Austin, Austin, TX.  
Dissertation: *New Coding Techniques for Distributed Storage Systems.*
- 2006–2010 **B.Tech. in Electrical Engineering**  
Indian Institute of Technology (IIT) Kanpur, India.  
*Second highest CGPA among graduating students in Electrical Engineering at IIT Kanpur.*

### Internships

- 2013 **Alcatel Lucent Bell Labs**  
Project: *Buffer control and video quality selection algorithm for adaptive video streaming.*
- 2012 **DOCOMO Innovations**  
Project: *Interference alignment for multi-user multiple-input and multiple-output (MU-MIMO) systems.*
- 2009 **The Center for Advanced Systems and Engineering at Syracuse University**  
Project: *Security issues in collaborative spectrum sensing for cognitive radio.*

### Selected Publications

‡ – Authors are listed in alphabetical order.

- [1] Christos Thrampoulidis and **Ankit Singh Rawat**. The Generalized lasso for sub-gaussian measurements with dithered quantization. *under submission*, Available arXiv:1807.06976.
- [2] Raj Kumar Maity, **Ankit Singh Rawat**, and Arya Mazumdar. Robust gradient descent via moment encoding with LDPC codes. *under submission (extended abstract appeared with an oral presentation at SysML Conference, 2018)*, Available arXiv:1805.08327.
- [3] Arya Mazumdar and **Ankit Singh Rawat**‡. Representation learning and recovery in the ReLU networks. *under submission*, Available arXiv:1803.04304.
- [4] Christos Thrampoulidis and **Ankit Singh Rawat**. The phaselift for non-quadratic Gaussian measurements. *working paper*, Available arXiv:1712.03638.
- [5] **Ankit Singh Rawat**, Itzhak Tamo, Venkatesan Guruswami, and Klim Efremenko. MDS code constructions with small sub-packetization and near-optimal repair bandwidth. *Accepted to appear in IEEE Transactions on Information Theory*, January 2018. Available at arXiv:1709.08216.

- [6] **Ankit Singh Rawat**. Secrecy capacity of minimum storage regenerating codes. In *Proceedings of IEEE International Symposium on Information Theory (ISIT)*, pages 1406–1410, June 2017.
- [7] Venkatesan Guruswami and **Ankit Singh Rawat**<sup>‡</sup>. MDS code constructions with small sub-packetization and near-optimal repair bandwidth. In *Proceedings of the Twenty-Eighth Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 2109–2122, January 2017.
- [8] Arya Mazumdar and **Ankit Singh Rawat**<sup>‡</sup>. Associative memory using dictionary learning and expander decoding. In *Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence (AAAI)*, pages 267–273, February 2017.
- [9] **Ankit Singh Rawat**, Dimitris S. Papailiopoulos, Alexandros G. Dimakis, and Sriram Vishwanath. Locality and availability in distributed storage. *IEEE Transactions on Information Theory*, 62(8):4481–4493, August 2016.
- [10] **Ankit Singh Rawat**, Zhao Song, Alexandros G. Dimakis, and Anna Gal. Batch codes through dense graphs without short cycles. *IEEE Transactions on Information Theory*, 62(4):1592–1604, April 2016.
- [11] Arya Mazumdar and **Ankit Singh Rawat**<sup>‡</sup>. Associative memory via a sparse recovery model. In *Proceedings of the 28th International Conference on Neural Information Processing Systems (NIPS)*, pages 2701–2709, 2015.
- [12] Arya Mazumdar and **Ankit Singh Rawat**<sup>‡</sup>. On adversarial joint source channel coding. In *Proceedings of IEEE International Symposium on Information Theory (ISIT)*, pages 271–275, June 2015.
- [13] Casen Hunger, Mikhail Kazdagli, **Ankit Singh Rawat**, Alexandros G. Dimakis, Sriram Vishwanath, and Mohit Tiwari. Understanding contention-based channels and using them for defense. In *Proceedings of IEEE 21st International Symposium on High Performance Computer Architecture (HPCA)*, pages 639–650, February 2015.
- [14] **Ankit Singh Rawat** and Emina Soljanin. Dynamic control of video quality for avs. In *Proceedings of IEEE International Symposium on Information Theory (ISIT)*, pages 821–825, June 2014.
- [15] **Ankit Singh Rawat**, Onur Ozan Koyluoglu, Natalia Silberstein, and Sriram Vishwanath. Optimal locally repairable and secure codes for distributed storage systems. *IEEE Transactions on Information Theory*, 60(1):212–236, January 2014.
- [16] Avhishek Chatterjee, **Ankit Singh Rawat**, Sriram Vishwanath, and Sujay Sanghavi. Learning the causal graph of markov time series. In *Proceedings of 51st Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, pages 107–114, October 2013.
- [17] **Ankit Singh Rawat** and Sriram Vishwanath. On locality in distributed storage systems. In *Proceedings of IEEE Information Theory Workshop (ITW)*, pages 497–501, September 2012.
- [18] **Ankit Singh Rawat**, Priyank Anand, Hao Chen, and Pramod K. Varshney. Collaborative spectrum sensing in the presence of byzantine attacks in cognitive radio networks. *IEEE Transactions on Signal Processing*, 59(2):774–786, February 2011.

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## Invited Talks

- June 2018 High-dimensional Inference for Non-linear Models,  
*Google*, New York City, NY.
- June 2018 Secure Distributed Storage and its Connections to Communication-efficient Secret Sharing,  
*SIAM Conference on Discrete Mathematics*, Denver, CO.
- April 2018 MDS Codes with Small Sub-packetization and Near-optimal Repair Bandwidth,  
*Workshop on Coding and Information Theory, CMSA, Harvard University*, Cambridge, MA.
- March 2018 New Paradigm for Data Storage and Processing in Large-scale Distributed Systems,  
*Departments of Computer Science and Electrical & Computer Engineering, National University of Singapore*, Singapore.
- March 2018 Representation Learning and Signal Recovery in Nonlinear Models,  
*Dagstuhl Seminar Series on Coding Theory for Inference, Learning, and Optimization*, Wadern, Germany.
- October 2017 Faster Data-Processing in Cloud-based Systems,  
*Signal and Information Processing Seminar Series, Rutgers University*, Piscataway, NJ.
- October 2017 Efficient Data Access in Hybrid Cloud Storage,  
*55th Annual Allerton Conf. on Communication, Control, and Computing (Allerton)*, Monticello, IL.

- June 2017 MDS Codes with Small Sub-packetization and Near-optimal Repair Bandwidth,  
*6th Biennial Canadian Discrete and Algorithmic Mathematics Conf. (CanaDAM)*, Toronto, Canada.
- March 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.
- November 2016 New Coding Techniques for Distributed Storage Systems,  
*Department of Electrical and Computer Engineering, Texas A&M University*, College Station, TX.
- September 2016 Neural Auto-associative Memory via Sparse Recovery,  
*LIDS & Stats Tea Talk, Massachusetts Institute of Technology*, Boston, MA.
- April 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 Inf. and Computer Sciences, University of Massachusetts*, Amherst, MA.
- February 2016 New Coding Techniques for Distributed Storage Systems,  
*Graduation Day Talk, Information Theory and Applications Workshop (ITA)*, San Diego, CA.
- October 2015 Codes to Enable Parallel Reads in Distributed Storage Systems,  
*Theory Lunch Seminar, Computer Science Department, Carnegie Mellon University*, Pittsburgh, PA.
- October 2015 Dynamic Control of Video Quality in Adaptive Video Streaming,  
*BIRS Workshop on Mathematical Coding Theory for Streaming*, Banff, Canada.
- December 2013 Update and Repair Efficient Codes for Distributed Storage,  
*DIMACS Workshop on Algorithms for Green Data Storage*, Piscataway, NJ.
- September 2013 Optimal Locally Repairable Codes for Distributed Storage Systems,  
*Department of Electrical & Computer Engineering, University of Minnesota*, Minneapolis, MN.
- August 2013 Optimal Locally Repairable Codes for Distributed Storage Systems,  
*Mathematics Colloquium & Informal Seminar*, Bell Labs, NJ.

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## Teaching & Mentoring Experience

- Fall 2017 – **Gary Lee**, MIT.  
present ○ Mentoring Gary for an ongoing project on performing reliable sensing in the presence of faulty sensors.
- Fall 2017 – **Raj Kumar Maity**, UMass Amherst.  
present ○ Mentoring Raj for his work on performing coded computation to mitigate the effect of straggling servers in a distributed computing setup.
- 2015 – 2017 **Hardik Jain & Ethan R. Elenberg**, UT Austin.  
○ Mentored Hardik and Ethan as a part of the project on designing coded memory system to avoid bank-conflicts in a multi-core setup.
- Spring 2015 **Teaching Assistant** for Information Theory (EE381K-7), UT Austin.  
Instructor: *Prof. Alexandros G. Dimakis*.
- Spring 2013 **Teaching Assistant** for Modeling of Large Wireless Networks (EE381K-5), UT Austin.  
Instructor: *Prof. François Baccelli*.

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## Awards and Achievements

- 2010–2011 Recipient of **Microelectronics and Computer Development (MCD) Fellowship** at UT Austin.
- 2008–2009 Recipient of **Sri Singhasan Singh Scholarship** at IIT Kanpur.
- 2006–2008 Awarded **Academic Excellence Award** for the academic years 2006-07 & 2007-08 at IIT Kanpur.
- 2006–2010 Recipient of **Nita Goyal and Ashish Gupta Scholarship** at IIT Kanpur.
- 2006 Awarded **CBSE Merit Scholarship** for securing all India rank (AIR) **159** in All India Engineering Entrance Examination (AIEEE) 2006.

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## Selected Coursework

Sparsity, Structure and Algorithms, Convex Optimization: Theory and Applications, Randomized Algorithms, Learning Theory, Algorithms: Techniques and Theory, Coding Theory, Information Theory and Statistics, Theory of Probability I & II, Data Mining: A Mathematical Perspective, Universal Compression Algorithms and Entropy Rate.

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## Computer Skills

Python, C, C++, Java, MATLAB, TensorFlow.

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## Professional Service

### Technical Program Committee (TPC) Member:

- IEEE International Symposium on Information Theory (ISIT), 2018.
- International Workshop on Distributed Storage Systems and Coding for Big Data (BigData) 2017.
- International Workshop on Distributed Storage Systems and Coding for Big Data (BigData) 2015.

### Session Chair:

- Information Theory and Applications Workshop (ITA) 2016.

### 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.
- IEEE Transactions on Network Science and Engineering.
- IEEE International Symposium on Information Theory (ISIT), 2011 – 2018.
- International Conference on Machine Learning (ICML), 2018.
- Conference on Neural Information Processing Systems (NIPS), 2016 – 2018.
- International Conference on Randomization and Computation (RANDOM), 2018.
- IEEE Symposium on Foundations of Computer Science (FOCS), 2017.
- IEEE International Conference on Computer Communications (INFOCOM), 2017, 2018.
- IEEE Information Theory Workshop (ITW), 2014, 2015, 2017.
- IEEE Vehicular Technology Conference (VTC), 2014.
- IEEE International Symposium on Personal, Indoor and Mobile Radio Comm. (PIMRC), 2013.
- IEEE Wireless Communications and Networking Conference (WCNC), 2013.
- IEEE International Conference on Communications (ICC), 2012.
- IEEE International Symposium on Information Theory and Its Applications (ISITA), 2012.
- IEEE International Conference on Cognitive Radio Oriented Wireless Networks (CROWNCOM), 2011.
- IEEE Global Communications Conference (GLOBECOM), 2011.
- IEEE Symposium on Computers and Communications started (ISCC), 2011.
- International Conference on Signal Processing and Communications (SPCOM), 2010.