

CURRICULUM VITAE

SOURYA BASU

Graduate student

Electrical & Computer Engineering

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RESEARCH INTERESTS

Natural language processing, machine learning, information theory, and abstract algebra.

EDUCATION

- 2020 **PhD in Electrical & Computer Engineering**, *University of Illinois at Urbana-Champaign*
- present Advisor: Prof. Lav R. Varshney
- 2018 **MS in Electrical & Computer Engineering**, *University of Illinois at Urbana-Champaign*
- 2020 Advisor: Prof. Lav R. Varshney
GPA - 3.96
- 2017 **B. Tech. in Electrical Engineering**, *Indian Institute of Technology Kanpur*
Minor in Artificial Intelligence, CPI - 9.6/10.0
- 2013 **Senior School Certificate Examination**, *S.M.Arya Public School, New Delhi*
Scored 89.8% marks in XII AISSE
- 2011 **Secondary School Certificate Examination**, *S.M.Arya Public School, New Delhi*
CGPA - 9.8 in X AISSE

PUBLICATIONS & PREPRINTS

- MAY 2021 **S. Basu, G. S. Ramachandran, N. S. Keskar, and L. R. Varshney, "Mirostat: A Neural Text Decoding Algorithm that Directly Controls Perplexity"**, to appear in Proceedings of the 9th International Conference on Learning Representations (ICLR), [Vienna, Austria], 4-8 May 2021. [\[Paper\]](#) [\[Blog\]](#)
- MARCH 2021 T. Ameen ur Rahman, A. S. Barbehenn, X. Chen, H. Dbouk, J. A. Douglas, Y. Geng, I. George, J. B. Harvill, S. W. Jeon, K. K. Kansal, K. Lee, K. A. Levick, B. Li, Z. Li, Y. Murthy, A. Muthuveeru-Subramaniam, S. Y. Olmez, M. J. Tomei, T. Veeravalli, X. Wang, E. A. Wayman, F. Wu, P. Xu, S. Yan, H. Zhang, Y. Zhang, Y. Zhao, **S. Basu**, and L. R. Varshney, "**The Twelffold Way of Non-Sequential Lossless Compression**," to appear in Proceedings of the IEEE Data Compression Conference (DCC), Snowbird, Utah, 23-26 March 2021. [\[Paper\]](#)
- JUNE 2020 **S. Basu, D. Seo, and L. R. Varshney, "Hypergraph-based Coding Schemes for Two Source Coding Problems under Maximal Distortion"**, in *Proceedings of the 2020 IEEE International Symposium on Information Theory (ISIT)*, [Los Angeles, California], 21-26 June 2020. [\[Paper\]](#)
- MARCH 2020 **S. Basu, D. Seo, and L. R. Varshney, "Functional Epsilon Entropy"**, to appear in *Proceedings of the IEEE Data Compression Conference (DCC)*, [Snowbird, Utah], 24-27 March 2020. [\[Paper\]](#)
- JULY 2019 **S. Basu and L. R. Varshney, "Polar Codes for Simultaneous Information and Energy Transmission"**, in *Proceedings of the 20th IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, [Cannes, France], 2-5 July 2019. [\[Paper\]](#)
- DECEMBER 2018 **S. Basu and L. R. Varshney, "Succinct Source Coding of Deep Neural Networks"**, in *Proceedings of NeurIPS Compact Deep Neural Network Representation with Industrial Applications Workshop (CDNNRIA)*, Montreal, Canada. [\[Paper\]](#)
- NOVEMBER 2018 A. Raikar, **S. Basu**, and R. M. Hegde, "**Single Channel Joint Speech Dereverberation and Denoising using Deep Priors**", 2018 IEEE Global Conference on Signal and Information Processing (GlobalSIP). [\[Paper\]](#)
- APRIL 2018 **S. Basu and L. R. Varshney, "Universal and Succinct Source Coding of Deep Neural Networks"**, (submitted to IEEE Transactions on Information Theory). [\[Paper\]](#)
- JUNE 2016 **S. Basu, S. Chaturvedi, and R. M. Hegde, "Text Compression Using Lexicographic Permutation of Binary Strings"**, *Eleventh International Conference on Signal Processing and Communications (SPCOM)*, IEEE, 2016. [\[Paper\]](#) [\[Presentation\]](#)

TEACHING AND SERVICE

- Teaching assistant ECE 563 Information Theory (Fall 2020)
- Reviewer ISIT 2020, ITW 2021

AWARDS AND ACHIEVEMENTS

- ECE Distinguished Research Fellow at the University of Illinois at Urbana-Champaign. (2019-2022)
- James M. Henderson Fellow at the University of Illinois at Urbana-Champaign. (2019-2020)
- Dilip and Sandhya Sarwate Graduate Fellow at the University of Illinois at Urbana-Champaign. (2018-2019)
- Received Academic Excellence Award at IIT Kanpur for distinctive academic performance for the years 2013-14, 2014-15, 2015-16.
- Ranked amongst the top 10 teams across all the IITs in Ericsson Innovation Award 2014-2015.
- Secured All India Rank 181 in JEE ADVANCED 2013 out of 0.15 million students.
- Kishore Vaigyanik Protsahan Yojna (KVPY) Scholar, awarded to top 600 students in India.
- Certificate of Merit for qualifying for Indian National Chemistry Olympiad (Theory) 2013.
- Certificate of Merit for being placed in National Top 1% in National Standard Examination in Physics-2012-13 among 40,000 candidates.
- Certificate of Merit for being placed in State wise Top 1% in National Standard Examination in Astronomy-2012-13.
- Secured 16th rank in Junior Science Talent Search Examination, conducted by Science Branch, Directorate of Education, Govt. of NCT of Delhi (in 9th grade).
- Participated in the Kishore Vaigyanik Protsahan Yojna (KVPY) Camp held at IISER Mohali and IISc Bangalore during May 2012 and December 2012 respectively.

GRADUATE COURSEWORK

- ECE 534-Random Processes: Fall 2018 with Prof. O. Milenkovic: A+
- ECE 563-Information Theory: Fall 2018 with Prof. L. Varshney: A+
- ECE 561-Detection and Estimation Theory: Spring 2019 with Prof. V. Veeravalli: A
- ECE 543-Statistical Learning Theory: Spring 2019 with Prof. B. Hajek: A
- Math 417-Introduction to Abstract Algebra: Fall 2019 with Prof. F. Boca: A+
- Math 598-Concentration Inequalities and Stein's Method: Fall 2019 with Prof. P. Dey: A-
- ECE 556-Coding Theory: Spring 2020 with Prof. O. Milenkovic: A+
- ECE 544-Pattern Recognition: Fall 2020 with Prof. A. Schwing: A
- CS 598-Statistical Reinforcement Learning: Fall 2020 with Prof. N. Jiang: A

RELEVANT UNDERGRADUATE COURSEWORK

- Computer Science: Artificial intelligence programming, Machine learning techniques, Data structures and algorithms, Fundamentals of computing.
- Signal Processing: Signals, systems and networks, Digital Signal Processing, Speech Signal Processing.
- Mathematics: Probability and Statistics, Linear Algebra, Complex Analysis, Differential Equations, Calculus, Mathematical Logic.
- Other relevant course: Neural Networks, Introduction to game theory.

UNDERGRADUATE RESEARCH INTERNSHIP

Universal Compression of Graphs and Graph Signals

Summer 2016

Guided by Prof. Lav R. Varshney, University of Illinois at Urbana-Champaign

- **Aim:** To develop universal compression algorithms for graphs and graph signals, taking into account various invariant properties that are present in group-theoretic characterization of these discrete structures.
- **Results:** Computed entropy bounds for several graphical structures, graph signal models and proposed efficient compression algorithms whose performance was compared to the achieved bounds. The work was published in **Data Compression Conference (DCC), 2017**.

TECHNICAL SKILLS

Languages: C,C++, PYTHON

Tools: PYTORCH, MATLAB, MATHEMATICA

POSITIONS OF RESPONSIBILITY & SOCIAL INITIATIVES

Secretary, Electronics Club, IITK:

Fall 2014

- Conducted workshops on Digital Clock for freshmen giving them hands-on experience of several ICs and their application in digital devices. Also, mentored freshmen for Electromania, an event under electronics club in TAKNEEK 2014, intra-IITK Science and Technology Championship.

National Service Scheme:

Fall 2013 & Spring 2014

- Tutored students from class 5th to 8th in the topics of mathematics and science.
- Conducted a science exhibition for elementary and middle school students.