Sourya Roy

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Google Scholar

Education

2016-2022 **Ph.D. in Computer Science**, *UC Riverside*, GPA: 3.93/4, *Riverside, California*
Advisor: Silas Richelson, Amey Bhangale

2011-2015 **B.E. in Instrumentation and Electronics Engineering**, *Jadavpur University*, GPA: 8.48/10, *Kolkata, India*

Experience

2023-Present **Assistant Professor**, *Computer Science Department, University of Iowa*, Iowa

2022-2023 **Data Scientist**, *Foursquare Inc.*, Los Angeles

2017-2022 **Graduate Student Researcher and Teaching Assistant at UC Riverside**, *UC Riverside*, Riverside

Summer'21 **Multimodal Learning Intern**, *Intel AI Lab*, San Diego

Research Interests

Theory of computation, Algorithmic foundations, Machine learning (ML), Computer vision (CV)

Selected Computation Theory Projects

2023-2024 **Derandomized homomorphism testing over finite groups**
- Designed a randomness–efficient homomorphism test in the high error regime for functions from an arbitrary finite group to unitary matrices.

2021-2022 **Construction of almost Ramanujan expanders from arbitrary expanders**
- Gave an efficient algorithm that makes any family of expanders to near optimal.
- Our results give better parameters for other objects (e.g. quantum expanders).

2021-2022 **Decoding of Ta-Shma's near-optimal binary codes at Johnson Bound**
- Designed a SDP based efficient decoding algorithm that achieves Johnson bound.

2021 **Mixing of 3-term progressions in Quasirandom Groups**
- Proved a more than a decade old conjecture on 3-term progressions by Gowers.

2019-2020 **Provably secure message encoding scheme with validity testing**
- Proposed a new non-malleable encoding scheme with code-word validity testing.
- Proved security of the encoding algorithm.
- Along the way, we gave a new construction of affine non-malleable code.

Selected CV and ML Projects

2022 **Metrics for selection and value assessment of large scale data sources.**

- Built unsupervised location data quality metrics.
- Built optimized resource allocation framework using tools from operations research. Very high Projected impact on cost savings.

2021-2022 **Multi-modal data analysis using graph neural networks(GNN)**

- Built a SOTA GNN model for active speaker detection.

2017-2019 **Data labeling scheme for reducing annotation in Person Re-id**

- Developed a graph based annotation scheme that minimizes labeling requirement.
- Analyzed large graphs (3 millions edges) and reduced required annotation by 80-90%.

2017-2018 **Weakly supervised activity localization and classification in videos**

- Proposed a novel loss function for the task and our algorithm achieved SOTA results.

Conference Papers

Pseudorandomness of Expander Walks via Fourier Analysis on Groups, *Fernando Granha Jeronimo, Tushant Mittal and Sourya Roy (Alphabetically sorted), Accepted to 2025 International Conference on Randomization and Computation (RANDOM 2025)*

Sublinear-time Sampling of Spanning Trees in the Congested Clique, *Sriram V Pemmaraju, Sourya Roy, Joshua Z Sobel(Alphabetically sorted), 2025 ACM Symposium on Principles of Distributed Computing (PODC 2025)*

Gilbert and Varshamov Meet Johnson: List-Decoding Explicit Nearly-Optimal Binary Codes (Link), *Silas Richelson, Sourya Roy(Alphabetically sorted), 2023 IEEE 64th Annual Symposium on Foundations of Computer Science (FOCS 2023)*

Almost Ramanujan Expanders from Arbitrary Expanders (Link), *Fernando Granha Jeronimo, Tushant Mittal, Sourya Roy, Avi Wigderson(Alphabetically sorted), 2022 IEEE 63rd Annual Symposium on Foundations of Computer Science (FOCS 2022)*

Mixing of 3-term progressions in Quasirandom Groups (Link), *Amey Bhangale, Prahladh Harsha, Sourya Roy(Alphabetically sorted), 13th Innovations in Theoretical Computer Science Conference (ITCS 2022)*

Learning Long-Term Spatial-Temporal Graphs for Active Speaker Detection (Link), *Kyle Min†, Sourya Roy†, Subarna Tripathi, Tanaya Guha, Somdeb Majumdar(† : First authors), European Conference on Computer Vision (ECCV), 2022.*

Exploiting transitivity for learning person re-identification models on a budget(Link), *Sourya Roy, Sujoy Paul, Neal E. Young, Amit K Roy-Chowdhury, EEE Conference on Computer Vision and Pattern Recognition (CVPR), 2018.*

W-TALC: Weakly-supervised Temporal Activity Localization and Classification(Link), *Sujoy Paul, Sourya Roy, Amit K Roy-Chowdhury, European Conference on Computer Vision (ECCV), 2018.*

Incorporating Scalability in Unsupervised Spatio-Temporal Feature Learning (Link), *Sujoy Paul, Sourya Roy, Amit K Roy-Chowdhury, 2018 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2018)*

Comparison of Cartesian and polar estimates of the EKF for different choices of the robustness and sensitivity metrics (Link), *Sourya Roy, Ratna Ghosh, Bhaswati Goswami, 3rd International Conference on Advances in Control and Optimization of Dynamical Systems (2014)*

Journal Papers

Almost-Ramanujan Expanders From Arbitrary Expanders via Operator Amplification (Link), *Fernando Granha Jeronimo, Tushant Mittal, Sourya Roy, and Avi Wigderson (Alphabetically sorted), SIAM Journal on Computing, 2025.*

Analyzing Ta-Shma's Code via the Expander Mixing Lemma(Link), *Silas Richelson, Sourya Roy (Alphabetically sorted), IEEE Transactions on Information Theory, 2023.*

A discrete magno–parvo additive model in early vision for explaining brightness perception in varying contrastive contexts (Link), *Ashish Bakshi, Sourya Roy, Arijit Mallick, Kuntal Ghosh, Biological Cybernetics, 2022.*

Limitations of the Oriented Difference of Gaussian Filter in Special Cases of Brightness Perception Illusions (Link), *Ashish Bakshi, Sourya Roy, Arijit Mallick, Kuntal Ghosh, Perception, 2015.*

Preprints and Reports

Derandomized Non-Abelian Homomorphism Testing in Low Soundness Regime, *Tushant Mittal, Sourya Roy(Alphabetically sorted authors list), 2024, In submission.*

Locally Testable Non-Malleable Codes (Link), *Silas Richelson, Sourya Roy(Alphabetically sorted authors list), Electronic Colloquium on Computational Complexity, 2020*

Visual saliency detection: a Kalman filter based approach (Link), *Sourya Roy, Pabitra Mitra, 2016*

Invited Talks

Theory Seminar, *University of Washington*, May, 2023

CS theory Seminar, *Georgetown University*, November, 2022

Invited Workshop attendance

Advances in the Theory of Error-Correcting Codes, *Simons Institute for the Theory of Computing at University of California, Berkeley*, April, 2024

Seminar Talks

CS Theory Seminar, *University of California, San Diego*, February, 2020

SoCal Theory Day, *University of California, Riverside*, January, 2020

Teaching Experience

Spring'25 **CS:3330 Algorithms**

Fall'24 **CS:4310 Design and Implementation of Algorithms**

Spring'24 **CS:3330 Algorithms**

Fall'23 **CS:4980 TOPICS IN COMPUTER SCIENCE II**

Teaching Assistant Experience

Fall'17 **Probability and Stochastic Processes**

Winter'18 **Design and analysis of algorithms**

Spring'17,'20 **Combinatorial Optimization**

Winter'21 **Intro to Programming**

Spring'21 **Introduction to Computer Science for Science, Mathematics, and Engineering**

Fall'21 **Introduction to Data Structures and Algorithms**

Reviewing activities

Journals: **Information Processing Letters, Information Sciences, Pattern Recognition, IEEE Transactions on Circuits and Systems for Video Technology, Computational Intelligence, Applied Artificial Intelligence, Neurocomputing**

Conferences: **FSTTCS 2021, Random 2023**

Awards

Dean's distinguished fellowship, *September 2016*, UC Riverside