



Abhinav Vaishya

Education

Jul 2018 - Jun 2023 **Bachelor of Technology (Honours) and Master of Science by Research, Computer Science and Engineering**, International Institute of Information Technology, Hyderabad (IIIT-H).
Advisor: [Dr. Prasad Krishnan](#)
Thesis Title: Low Complexity Cache-Aided Communication Schemes for Distributed Data Storage and Distributed Computing [[Slides](#)]
Specialization: Algorithms and Theory [[Certificate](#)]

Research Experience

- Jul 2023 - Present **Research Associate**, Indian Institute of Science, Bangalore (IISc).
- Quantum Error-Correcting Codes (QECC)
 - Worked on constructing multimode Gottesman-Kitaev-Preskill (GKP) codes with better error-correcting properties through the lens of lattice theory.
 - Currently working on Erasure-Decoding for Quantum Expander Codes under the supervision of [Prof. Lalitha Vadlamani](#).
 - Audited a course on QECC taught by Prof. Navin Kashyap at IISc.
 - Have been a part of the Quantum Codes reading group, where I have presented Qudit Stabilizer Codes and Small-Set-Flip Decoding Algorithm for Quantum Expander Codes.
 - Advisor: [Prof. P Vijay Kumar](#)
- Jun 2022 - Jun 2023 **Research Intern**, Technical University of Munich (Remote).
- Codes for Distributed Storage and Coding Theory for Blockchains
 - Did comprehensive literature survey on the topics and presented the same.
 - Advisor: [Dr. Rawad Bitar](#)
 - Was unable to continue working after graduating from IIIT-H and joining IISc.
- May 2021 - Jun 2023 **Research Assistant**, IIIT-H.
- Coded Caching via Locally Recoverable Codes (In progress)
 - Constructed a scheme that has parameters identical to the rate-optimal Maddah-Ali-Niesen scheme.
 - Have a few more interesting results on the connection between Coded Caching and Locally Recoverable Codes.
 - Coded Caching via Subspace Designs (Accepted at IEEE JSAIT, 2023)
 - Worked out the proof and did numerical analysis for a coded caching (and distributed computing) scheme based on subspace designs.
 - Lower bound for the Coded Data Rebalancing problem (Submitted to IEEE TIT)
 - Derived a lower bound using index coding proof techniques.
 - Coded Data Rebalancing for Distributed Data Storage Systems with Cyclic Storage (Accepted at IEEE ITW, 2022)
 - Constructed rebalancing schemes for single node removal and addition scenarios in replication-based distributed storage systems.
 - Presented the paper at ITW, 2022.
 - Advisor: [Prof. Prasad Krishnan](#)

Aug 2020 - Apr 2021 **Undergraduate Researcher**, IIIT-H.
○ Coded Data Rebalancing for Distributed Data Storage Systems
○ Advisor: [Prof. Prasad Krishnan](#)

Work Experience

Jan 2023 - May 2023 **Teaching Assistant**, IIIT-H.
○ Information-Theoretic Methods in Computer Science, Spring '23
○ Introduction to Coding Theory, Spring '22
○ Linear Algebra, Spring '21
○ The role involved conducting tutorials, setting and evaluating assignments and exams.

Jun 2019 - Oct 2019 **Problem Setter**, Hackerrank.
○ Prepared various original programming and algorithmic problems along with strong testcases.

Aug 2018 - Dec 2018 **Web Developer**, VLEAD, IIIT-H.
○ Worked on building a web application for interactive online learning modules.

Publications

1. **Abhinav Vaishya**, Athreya Chandramouli, Srikar Kale, Prasad Krishnan, "Coded Data Rebalancing for Distributed Data Storage Systems with Cyclic Storage", preprint, submitted to IEEE Transactions on Information Theory (TIT). [[Arxiv](#)]
2. Shailja Agrawal, K V Sushena Sree, Prasad Krishnan, **Abhinav Vaishya**, Srikar Kale, "Cache-Aided Communication Schemes via Combinatorial Designs and their q -analogs", IEEE Journal on Selected Areas in Information Theory (JSAIT), 2023. [[IEEE](#)]
3. Athreya Chandramouli*, **Abhinav Vaishya***, Prasad Krishnan, "Coded Data Rebalancing for Distributed Data Storage Systems with Cyclic Storage", IEEE Information Theory Workshop, 2022. [[IEEE](#)][[Slides](#)]

* indicates equal contribution

Course Projects (Selected)

Spring 2021 **Encoding and Decoding of Reed Solomon Codes (Language: Python 3)**
○ Implemented the encoding and decoding procedures of Reed Solomon Codes. Sympy was used in the implementations. This project was a part of the course Topics in Coding Theory. [[GitHub](#)]

Spring 2020 **Distributed Systems and Algorithms**
○ Implemented many graph based and sorting algorithms, a simple single server architecture (supports multiple clients), for distributed systems using OpenMP(C++), MPI(C++), Cuda(C++/Python), and RMI(Java). This project was a part of the course Distributed Systems. [[GitHub](#)]

Spring 2020 **Applications of Linear Programming (Language: Python 3)**
○ Used Linear Programming for solving various interesting problems such as - Jigsaw Puzzle, Sudoku, Convex Hull, and Largest Circle in a Polygon. This project was a part of the course Optimization Methods. [[GitHub](#)]

Relevant Courses

Algorithms and Theory (at IIIT-H) Algorithms, Complexity and Advanced Algorithms, Computational Complexity Theory, Principles of Information Security, Introduction to Coding Theory*, Topics in Coding Theory, Information-Theoretic Methods in Computer Science*, Advanced Mathematical Structures.

Theory (at IISc) Quantum Error-Correcting Codes**

* indicates that I attended the course as a Teaching Assistant

** indicates that I audited the course

Skills

Languages C, C++, Python, MATLAB, Java, Javascript, SQL, Erlang, TeX

Libraries numpy, scipy, sympy, MPI

Miscellaneous

- Ranked 88th in ACM-ICPC Online Round 2019-20. (Honorable Mention) [[Certificate](#)]
- Selected for the Onsite Round of ACM-ICPC Asia Regionals, Amritapuri 2019-20.
- Certificate for Problem Solving (Advanced) by Hackerrank. [[Certificate](#)]
- Merit List awardee.