Aniruddha Sen

Curriculum Vitae

Education

2024– **PhD in Computer Science**, *The University of Texas at Austin*, *GPA – N/A*.
Advised by Scott Aaronson and Nick Hunter-Jones. Specializing in quantum computing theory.

2020–2024 **Bachelor of Science in Computer Science**, *The University of Massachusetts Amherst*, *GPA – 4.0*.
Double Major in Mathematics. Graduated *Summa Cum Laude*, *Departmental Honors with Greatest Distinction*
Relevant Coursework: Quantum Information Science (Grad.), Theory of Computation (Grad.), Randomized Algorithms (Grad.), Modern Analysis (Grad.), Quantum Mechanics, Combinatorics & Graph Theory, Cryptography, Abstract Algebra, Number Theory

Experience

Research

2023–2024 **Undergraduate Researcher**, ACQuIRe Lab, Umass Amherst, Amherst, MA.
Advised by: Distinguished Professor Don Towsley
- Designed and analyzed algorithms for generating multipartite entanglement in a quantum network, and evaluated their performance through classical simulation.
- Obtained a quadratic improvement over prior work on distributing an arbitrary graph state across a quantum network

Summer 2023 **Quantum Research Intern**, LPNA, The University of Illinois Urbana-Champaign, Champaign, IL.
Advised by: Professor Edgar Solomonik
- Designed and analyzed algorithms for the simulation of Clifford quantum circuits and general quantum circuits by using ZX-calculus and tensor network contractions combined in a hybrid approach.
- Compared Clifford simulation algorithm to computation in a measurement based quantum computer using gFlow measure
- Parameterized general circuit simulation complexity through a novel parameter – minimum rank of its adjacency matrix

2022-2023 **Undegraduate Research Assistant**, *Quantum Information Theory Lab, Umass Amherst*, Amherst, MA.
Advised by: Professor Chen Wang
- Worked with superconducting *fluxonium* qubits and studied circuit quantum electrodynamics (cQED) to carry out 9 experiments with qubit controllers using PYNQ software
- Executed resonator spectroscopy and pulse programming techniques to calibrate ZCU216 Xilinx FPGA boards

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Summer 2022	**Research Intern**, *Knexus Research Corporation*, Oxon Hill, MD.

○ Established information theoretic bounds for inequity in partition based privacy for data deidentification

○ Analyzed differential privacy algorithms and developed 3 'reduced-size feature sets' to contribute towards equity concerns for the synthetic data NIST GitHub repository (usgov/SDNist)

Leadership

2022-2023	**Undergraduate Course Assistant**, *Manning CICS, UMass*, Amherst, MA.

○ Evaluated assignments, facilitated discussion sections and held office hours for the course CS 311 - *Introduction to Algorithms*, with over 100 students

2022-2023	**Residential Assistant**, *RLS, UMass*, Amherst, MA.

○ Enforced residential life policies to promote academic excellence and address student needs for a student population of over 400

Workshops

2023	**MPI**, *Cornell, Maryland, Max Planck Pre-doctoral Research School (CMMRS)*, Saarbrücken, Germany.

○ Attended research seminars at CMMRS 2023 as part of a fully-funded invitation to the Max Planck institute (MPI)

2023	**NYUAD**, *NYU Abu Dhabi International Quantum Computing Hackathon*, Abu Dhabi, UAE.

○ Invited to the 3-day international NYUAD Quantum Computing Hackathon cum Conference as part of less than 20 participants from the US

Bachelors Thesis

Title	*Multipartite Entanglement in Quantum Networks using Subgraph Complementations*
Supervisors	Distinguished Professor Don Towsley & Professor Stefan Krastanov
Description	This thesis proposes a novel algorithm for distributing a graph state across a quantum network, drawing upon the mathematical theory of subgraph complementations.

Publications and Conference Proceedings

2023	**Sen, A.**, Task, C., Kapur, D., Howarth, G., & Bhagat, K. *Diverse Community Data for Benchmarking Data Privacy Algorithms*. Conference on Neural Information Processing Systems (NeurIPS)
2023	**Sen, A.**, Goodenough, K., & Towsley, D. *Multipartite Entanglement in Quantum Networks using Subgraph Complementations*. IEEE International Conference on Quantum Computing and Engineering (QCE) – Poster Paper
2023	**Sen, A.**, Pang, Y., & Solomonik, E. *Quantum Circuit Simulation using ZX-calculus and Tensor Network Contraction*. Workshop on Sparse Tensor Computations – Poster Presenatation
2023	**Sen, A.** *Randomized Tree Isomorphism*. MassURC – Oral Presentation
2022	Task, C., & **Sen, A.** *Inequity Resulting from Partitioned Deidentification*. RFI Response: Privacy-Enhancing Technologies to the Office of Science and Technology Policy

2022 Phalak, C., Chahal, D., **Sen, A.**, Mishra, M., & Singhal, R. *MAPLE – Model Aggregation and Prediction for Learned Ecosystem*. ACM International Conference on Performance Engineering – Demo Paper

Awards and Recognitions

2024 **Yale** YQuantum, Classiq Winner – Awarded First place for the Classiq challenge at the hackathon for implementation of a sparse quantum state preparation algorithm

2023 **IBM**, Qiskit Advocate – Contributing to quantum computing research, applications and qiskit as part of a select global community recognized by IBM

2023 **MIT** iQuHACK, Grand Prize Winner – Awarded First place for the IonQ challenge at MIT's annual quantum computing hackathon

2023 **NeurIPS**, Scholar Award – Conference attendance accommodation award for NeurIPS 2023 at New Orleans

2022 **ICPC** (International Collegiate Programming Contest) – Ranked First in the Northeast North America Regional Contest, New England (Outside Boston)

2022 **Phi Kappa Phi**, Certificate of Recognition – For academic excellence in the Commonwealth Honors College

2020 **UMass**, Chancellor's Award – Received a $64000 tuition waver on the basis of academic performance

2020-2024 **UMass CICS**, Dean's List – All semesters

Extra-Curricular

- University Tennis Team
- Piano grade 3
- Writing
- District Level Soccer
- Club Chess

"The more I think about language, the more it amazes me that people ever understand each other at all." - Kurt Gödel