Saurabh Totey Curriculum Vitae

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Education

University of Colorado, Boulder (Fall 2019 - Spring 2023)

Bachelors of Science in Computer Science (Summa Cum Laude)

Bachelors of Science in Engineering Physics (Summa Cum Laude)

GPA: 3.931 out of 4

Subjects:

- **Computer Science** (major GPA: 4.000)
- **Engineering Physics** (major GPA: 3.886)
- Mathematics (minor GPA: 3.750)
- Quantum Engineering (minor GPA: 4.000)
- Philosophy (minor GPA: 4.000)

Awards / Memberships

- President Joseph A. Sewall Esteemed Scholar Award (Fall 2019 - Spring 2023)
- Engineering Merit Scholarship (Fall 2019 - Spring 2023)
- Quantum Scholars Fellow with Scholarship (Spring 2023)
- Dean's List (8-time recipient over 2019 through 2023)
- Sigma Pi Sigma Member

Academic Experience

Research

Combes Theory Group (May 2022 - Present)

I am investigating the performance of random rotation-symmetric bosonic codes for quantum error correction in bosonic harmonic oscillator contexts in Professor Josh Combes' group. I originally made a senior thesis off of the results I generated from Python code written with QuTiP. The work has continued to include random translation codes (e.g. hexagonal GKP, etc.), and is now written in Julia. A draft of preliminary results is available at https://arxiv.org/abs/2311.16089.

Autonomous Vehicle Systems Laboratory (August 2021 - May 2022)

I worked with Dr. John Martin (then a graduate student) in Professor Hanspeter Schaub's group to compare physics-informed neural networks (PINNs) against traditional gravity models like spherical harmonics or polyhedral

models. This involved writing toy PINNs in Python and Tensorflow and coming up with novel methods of comparison. As a part of over one hundred students under the DLA funding, I was one of twenty-five selected students selected to present their work.

Sloan Digital Sky Survey 4 Work With Dr. Guy Stringfellow (May 2020 - May 2021)

I worked with Professor Guy Stringfellow to write code in Python to help make determinations about the chemical compositions of various stars. This involved pulling Sloan Digital Sky Survey 4 data and using that data to create data visualizations. There was also some work done on the analysis of Wolf-Rayet stars specifically.

MATH Independent Study (January 2020 - May 2020)

I worked with Professor Tianyuan Xu to write code to determine whether given words from a given Coxeter group are fully commutative. The initial code, which was written in Python for the Sagemath ecosystem, explored all commutations of letters within the word using either a breadth or depth first search, and checked that they were all allowed. If any commutation wasn't permitted, the word wasn't fully commutative.

Teaching

Classical Mechanics and Mathematical Methods I Learning Assistant (Spring 2023)

I helped students in the Classical Mechanics and Mathematical Methods I course at CU (PHYS 2210) taught by Professor Steven Pollock and Professor Ethan Neil. This involved aiding students with tutorials and clicker questions during lectures, and helping with homework in the course's twice-a-week help room. The course had over a hundred students.

Theory of Computation Grader (Fall 2022)

I graded over forty students' proof-based weekly assignments and distributed feedback for the Theory of Computation course at CU (CSCI 3434). I also managed certain parts of course infrastructure in tandem with the course professor, Professor Raf Frongillo, teaching assistant, and course assistant.

Data Structures Learning Assistant (Fall 2021)

I held office hours and helped students with coding assignments in CU's Data Structures course (CSCI 2270) taught by Professor Asa Ashraf. I also attended the weekly recitations and helped with that material. I'd aid about thirty to forty students every week on average.

Professional Experience

Amazon Web Services Software Development (July 2023 - Present)

I write operational health code and infrastructure changes to the Amazon Connect web service, which provides a customer service platform. My changes allow for more effective responses to problems that may arise within the service, and also prevent problems from making it to customers. The work involves writing tests, performing continuous integration and continuous deployment, participating in code reviews, and collaborating on goals and requirements across multiple teams.

Amazon Devices Software Development Internship (May 2022 - August 2022)

I wrote code to give screenless Alexa devices an indication of how much time remains on any active timers through the device's LEDs. I gave a final demonstration and presentation of my working feature. Making the feature required owning parts of the codebase and managing requirements and documentation between multiple teams with wildly varying locations while working entirely remotely.

PhET Simulations Software Development (May 2018 - August 2021)

I wrote JavaScript code for educational scientific simulations for classroom use on web browsers. I mainly worked on simulation code for specific simulations, but I also made various changes to common libraries. Such changes included code refactors and closing memory leaks. I developed significant portions of the Blackbody Spectrum, Curve Fitting, Number Line Integers, and Number Line Distance simulations.

Leadership Experience

HackCU Organizer (May 2021 - May 2023)

I was a part of the team that organized CU's annual HackCU hackathon along with other smaller hackathon events. I created significant portions of the websites and ensured that they were accessible to those with various impairments. I also planned and hosted workshops at events. As an organizer, I also conducted interviews for potential new organizers and members.

Languages

- **English** (native speaker)
- **Spanish** (proficient as a second language)
- French (intermediate)