Nakul Khambhati

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Interests

Theoretical Computer Science: Cryptography, Large Language Models, Combinatorics

Education

University of California, Los Angeles Sept. 2021–June 2025

- B.S. Mathematics & B.S. Computer Science. GPA: 3.96/4.00
  - Coursework: *Graph Theory, Linear Algebra (Honors), Numerical Analysis (Honors), Real & Complex Analysis (Honors), Theory of Computation, Data Structures & Algorithms, Software Construction.*
- M.A. Mathematics. (Integrated Masters - Departmental Scholar's Program.) GPA: 4.00/4.00
  - Graduate coursework: *Cryptography, Complexity, Probability, Discrete Math, Measure Theory.*

Research

Machine Learning - Watermarking Large Language Models, UCLA Nov. 2023–Present

- Mentored by Prof. Amit Sahai
  - Co-authoring a research paper that provides experimental evidence refuting assumptions made in Watermarks in the Sand. GitHub link.
  - Used PyTorch and Pandas for machine learning, natural language processing and data manipulation.
  - Worked on text processing and API integration, notably with OpenAI's GPT models.

Cryptography - Multiparty Computation, UCLA March 2023–Present

- Mentored by Prof. Rafail Ostrovsky, Prof. Vassilis Zikas.
  - Co-authoring a research paper (follow-up to [GIOZ17]) proving upper and lower bounds on secure multiparty computation (MPC) with sublinear communication in the presence of a mobile adversary.
  - A work in progress can be found here.

Activities

Theory@UCLA March 2023–Present

- President & Co-Founder
  - Established UCLA's first theoretical computer science student organization; recruited over 40 undergraduate and graduate students.
  - Collaborated in learning topics in lattice-based cryptography and secure multi-party computation.
  - Organized a reading group meeting weekly to present topics in the mathematics underlying theoretical computer science.

Olga Radko Endowed Math Circle, UCLA June 2022–Present

- Lead Instructor
  - Conducted weekly 2 hour problem-solving sessions for advanced high-school students.
  - Taught 3 different levels - Intermediate 2A, Advanced 2A and Advanced 3 - and approx. 80 students.
  - Designed worksheets in topics including graph theory, error-correcting codes and optimization.

Prometheus (Hybrid) - Rocket Project, UCLA Dec. 2021–June 2022

- Lead Engineer, Trajectory Simulations
  - Programmed a 6 degree-of-freedom simulation model in MATLAB for the hybrid fuel rocket team at UCLA.
  - Simulation was used to predict rocket apogee, off-the-rail-speed, and stability during ascent.
  - Designed an optimal thrust curve for the motor using OpenRocket.

Projects

SimplyTasks Jan. 2023–March 2023

- Front-end, task manager web app
  - Used React, Node.js, HTML and CSS to program a calendar heat-map for tasks color-coded according to urgency.
  - Other features of the app include ability to store user data on the back-end; users can add tasks, sub-tasks, sort by various preferences and view tasks in calendar mode.

Math Animations June 2020–Aug. 2020 & July 2021–Aug. 2021

- Programmed math animations using a Python library, Manim.
  - Provided visual aids in trigonometry and calculus for tutoring during the lockdown.
  - Created explanatory videos for an internship with DiagKNOWstics Learning, an online platform.

Honors

Ostrovsky Summer 2023 scholarship for research in computer science at UCLA 2023

Dean's Honors List every quarter at UCLA 2021-2023

IB Diploma World Topper: Final score of 45/45 2021

Passed the American Math Contest (AMC 12) and qualified for AIME 2019

Skills

Programming Languages & Frameworks: Python, PyTorch, Pandas, MATLAB, React, Node.js, C++

Other: LaTeX, Vim, Emacs, SolidWorks, OpenRocket, 3D Printing