

# Karan Newatia

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Website: <https://karannevatia.github.io/>

## Education

- **University of Pennsylvania** Philadelphia, PA  
*PhD, Computer Science* Jul 2020 - May 2025 (Expected)
  - Advised by Profs. Andreas Haeberlen and Linh Thi Xuan Phan
  - Research interests: distributed systems, security, privacy, applied cryptography
- **Cornell University** Ithaca, NY  
*Master of Engineering, Computer Science* Jan 2020 - May 2020
- **Cornell University** Ithaca, NY  
*Bachelor of Arts, Computer Science* Aug 2016 - Dec 2019

## Publications

- **Mycelium: Large-Scale Distributed Graph Queries with Differential Privacy.**  
E. Roth, **K. Newatia**, Y. Ma, K. Zhong, S. Angel, and A. Haeberlen.  
Proceedings of the 28th ACM Symposium on Operating Systems Principles (SOSP'21), Virtual, October 2021.

## Research Experience

- **Mycelium** University of Pennsylvania  
*Supervised by Profs. Andreas Haeberlen and Sebastian Angel* Oct 2020 - Aug 2021
  - Worked on designing and developing Mycelium, the first system to process differentially private queries over large graphs that are distributed across millions of user devices. Mycelium accomplishes strong privacy guarantees for users with a combination of cryptographic techniques (Fully Homomorphic Encryption, Zero Knowledge Proofs, Multi Party Computation), as well as a novel, semi-centralized mix network with telescoping circuits.
- **Supercloud Group** Cornell University  
*Supervised by Profs. Robbert van Renesse and Hakim Weatherspoon* Jun 2019 - Dec 2019
  - Worked on developing Vegvisir, a partition-tolerant blockchain for use in power-constrained IoT environments with limited network connectivity. Developed Android apps for emergency response and healthcare using the blockchain system. Integrated Vegvisir into Farmval.io (a startup which provides digital credit score evaluation of soil quality) using machine learning algorithms trained on agriculture datasets.
- **Applied Programming Languages Group** Cornell University  
*Supervised by Prof. Andrew Myers* Aug 2018 - May 2019
  - Implemented a distributed version of Scrabble with security guarantees using Fabric, a high-level programming language for building distributed applications with strong security.

- **Cislunar Explorers**

*Supervised by Prof. Mason Peck (Aerospace Eng.)*

Cornell University  
*Jun 2018 - Aug 2018*

- Worked on flight software for the Cislunar spacecraft to be carried as a secondary payload on NASA's Artemis 1 mission scheduled to launch in November 2021. Collaborated with JPL to implement flight telemetry using JPL's FPrime framework.

## Teaching Experience

### Teaching Assistant

*CIS 505: Software Systems*

University of Pennsylvania  
*Fall 2021*

- Responsibilities include grading programming assignments and exams, teaching special lab sessions, and holding weekly office hours.

### Peer Tutor

*Cornell University Engineering Success (CUES)*

Cornell University  
*Jan 2018 - May 2019*

- Tutored several students on a weekly basis in CS 3410 (Systems Programming) and CS 3110 (Data Structures and Functional Programming) for CUES, a program to increase the graduation rates of underrepresented minority and first generation college students in engineering.

### Code Afrique Mentor

<https://codeafrique.com>

Ghana  
*Jan 2019*

- Taught the basics of Computer Science using Python to over 450 high school students in Ghana at Code Afrique, a program designed to encourage African high school students to pursue Computer Science.

## Programming Skills

• Python • C • C++ • Java • OCaml

## Selected Coursework

- Operating Systems, Distributed Computing, System Security, Databases, Cryptography
- Machine Learning, Computational Linguistics, Language & Information, Large-Scale Machine Learning
- Algorithms, Functional Programming, Open-Source Software Engineering, Game Theory

## Activities

### AguaClara, Software sub-team

*Cornell University*

*Jan 2017 - May 2018*

- Used Python to model the environmental engineering equations behind the design of water treatment plants of AguaClara, a project team at Cornell which aims to provide clean drinking water to tens of thousands of people in Honduras and India.

### Project Hope

*Cornell University*

*Sep 2016 - May 2018*

- Volunteered for Project Hope at Cornell, a student organization dedicated to helping raise funds and awareness for improved education for impoverished school children in rural China.

### Club Table Tennis

*Cornell University*

*Sep 2016 - May 2018*