Noah Singer

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Education

Spring 2022 (anticipated) **A.B. in Computer Science and Mathematics**, *Harvard University*, Cambridge, MA, GPA 4.00/4.00.

Selected Coursework

Computer Science: Error-Correcting Codes; Cryptography; Spectral Graph Theory; Operating Systems; Systems Security; Algorithms. *Mathematics*: Algebraic Geometry; Commutative Algebra; Measure Theory & Functional Analysis.

Experience

Research

Summer 2020—present **Communication Complexity and Incidence Geometry**.
Studied connections between incidence geometry and deterministic communication complexity, focusing on bounds for point-hyperplane incidences, supported by Herchel-Smith Fellowship over Summer 2020. Ongoing research in communication complexity of Xor functions. *Adviser*: Prof. Madhu Sudan.

Spring 2020 **Deep Learning Generalization Experiments**, *CS 91r Project*.
Studied the generalization of neural networks trained on small image datasets. Conducted a systematic analysis of how withholding or adding extra information for training (labels, data points, etc.) affects generalization in a controlled setting. *Advisers*: Prof. Boaz Barak, Preetum Nakkiran.

Fall 2019 **Dynamic Memory Analysis**, *CS 263 Course Project*.
Built a forensic tool for the online analysis of heap memory; used strong connectivity properties to distinguish various singly- and multiply-linked data structures; and detected function pointers, with Nathan Contreras and Mridu Nanda. *Adviser*: Prof. James Mickens.

Teaching

Hosted office hours, graded exams and problem sets, and organized sections as an undergraduate Teaching Fellow:

Fall 2020 **CS 121: Introduction to Theoretical Computer Science**, *Prof. Madhu Sudan and Adam Hesterberg*, Harvard.
Organized "CS 121.5", advanced section with weekly guest lectures from faculty, graduate students, and postdocs at Harvard and MIT (also in Fall 2019).

Spring 2020 **CS 161: Operating Systems**, *Prof. James Mickens*, Harvard.

Fall 2019 **CS 121: Introduction to Theoretical Computer Science**, *Profs. Boaz Barak and Madhu Sudan*, Harvard.

Expository Writing

Author of several surveys and expository papers, including a survey on the Fiat-Shamir heuristic in cryptography (CS 127, adviser Prof. Boaz Barak, in-progress) and a paper on degree in topology and linking numbers of smooth knots (summer tutorial on de Rham cohomology by Joshua Wang). Produced polished scribe notes for CS 121.5 (see below). Forthcoming talk at Harvard Math Table on "Relativization in Complexity Theory."

Talks

Oct. 2020 **Relativization in Complexity Theory**, *Harvard Math Table*.

Internships

Summer 2019 **Software Engineering Intern**, *Airbnb*, San Francisco, CA.
Built a production data pipeline to discover and manage large quantities of search advertising keywords targeting Airbnb hosts, efficiently scaling up listing creation due to search ads by over 20% and generating tens of thousands of dollars in weekly revenue.

Skills

10+ years of programming experience; languages include Python, Java, C/C++, JavaScript, SQL, x86 assembly, HTML/CSS, and OCaml. Tools/frameworks include LaTeX, Django, Angular 2, PyTorch, and Git.

Community Involvement

Fall 2020 **Peer Concentration Adviser**, *Harvard University Department of Computer Science*.

Fall 2020 **WiCS Mentor**, *Harvard Women in Computer Science*.

Spring 2019 **Digital Literacy Project**.
Volunteered at Digital Literacy Project, teaching basic programming in Scratch and Processing.js to middle school students in Allston.

Awards

Summer 2020 **Herchel-Smith Fellowship**.
Received highly competitive summer research funding from Harvard.

Fall 2019 **Certificate of Distinction in Teaching**.
Awarded for >4.8/5 average section rating in Q Guide evaluations in teaching CS 121.

2018-2020 **John Harvard Scholar, Detur Book Prize**.

Updated 11/20/20.