

Roy Rinberg

CONTACT INFORMATION

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Location: New York, NY

EDUCATION

Columbia University, New York, NY 2021 - PRESENT
M.S. Computer Science; Thesis Track: Advised by Prof. Rachel Cummings and Prof. Steven Bellovin
New York University, New York, NY 2014 - 2018
B.A. Computer Science, Physics, Minor: Math.
Thomas Jefferson High School for Science and Technology, Alexandria, VA 2010 - 2014

Selected CS Coursework: Neural Networks, Foundations of Blockchain, Policy for Privacy Tech, ML, Security, Theory of Computation, Algorithmic Problem Solving, Algorithms, Operating Systems, Computer Systems Organization

Selected Math Coursework: Honors Algebra, Analysis, Probability, Linear Algebra, Calculus I-III, Grad Probability and Statistics for Data Science

Selected Physics Coursework: Statistical Mechanics, Computational Physics, Mathematical Physics, Quantum Mechanics, Electricity & Magnetism, Dynamics

SOFTWARE SKILLS

Programming Languages: Python, C, C++
Software: Linux, Pytorch, Tensorflow, Docker, Google Cloud Services, AWS ROS, ELK Stack, Pandas, Jenkins, Artifactory, SQL, Web-scraping, Opacus, Jax

RESEARCH EXPERIENCE

Columbia University, New York, NY AUGUST 2021 - PRESENT
Memorization & Privacy in ML [Advisors: Prof. Rachel Cummings and Prof. Steven Bellovin]

- Modern machine learning algorithms memorize training data. My main research studies trade-offs of memorization, privacy, and accuracy, primarily focusing on differential privacy.

New York University, New York, NY FEBRUARY 2017 - MAY 2018
Evolution of Language Models within Social Networks [Advisor: Prof. Bud Mishra]
This research investigated the development of echo chambers within social networks.

- Developed pipeline to study the evolution of clusters of users in social networks over time, which applied topological data analysis to study distances between Word2Vec models trained on text.
- Scraped Reddit to supplement a dataset of Reddit text from multiple years (~1TB).
- Helped with mathematical proofs underpinning theoretical framework, and ran simulations.
- Publication on arXiv.

WORK EXPERIENCE

Ouster, San Francisco, CA SEPTEMBER 2018 - JUNE 2021
Software Engineer

Ouster is a startup developing lidar sensors and technologies. I worked on a lidar-based collision avoidance system for large vehicles.

- Developed and deployed C++ algorithms that make real-time predictions about dangerous driving behavior.
- Developed pipeline to evaluate algorithms on 100s of hours of historical lidar data.
- Created automatic data-pulling service for IoT devices, saving >3hr/day across team.
- Improved logging and alerting (ELK stack) and continuous integration (Jenkins) frameworks.
- Developed and packaged python SDKs for cross-team developers and processes for visualization, management, and deterministic playback of data. Used ubiquitously across team.
- *Internship Project:* Produced open-source C++ lidar point-cloud data visualizer ([Github link](#)).

Career Copilots, San Francisco CA MAY 2020 - AUGUST 2020
Software Engineer Contractor

Career Copilots is a startup seeking to help individuals find jobs using data. In my spare time, I contracted as their first software engineer.

- Developed python web-scraper to scrape jobs-data to help users find roles catered to them.
- Developed pandas data-exploration pipeline for investigating LinkedIn user data.

INTERNSHIPS	<p>University of Toronto, Toronto, Ontario MAY 2022 - SEPTEMBER 2022 Privacy in Machine Learning [Advisor: Prof. Nicolas Papernot]</p> <ul style="list-style-type: none"> • Research on Individualization of PATE. Paper accepted to PoPETs 2023. • Extensions of Gaussian & Laplacian differential privacy primitives, and their application to ML. • Research on Catered PATE - an extension of previous work on customization of PATE (link). <p>Hong Kong University for Science and Technology, Hong Kong SUMMER 2016 Research in Industrial Projects for Students (RIPS-HK) [Advisor: Dr. Avery Ching] <i>RIPS-HK is an REU with HKUST and an industrial sponsor.</i></p> <ul style="list-style-type: none"> • Developed protocol for robust, acoustic communication by underwater drones in noisy channels, combining information theoretic approach and physics modeling of acoustic channels in water. • Team lead for team of 3 other students. <p>Janelia Research Campus, HHMI, Ashburn, VA SUMMER 2015 Scientific Computing Group [Advisors: Dr. Khaled Khairy and Dr. Sean Murphy] <i>Janelia Research Campus is a neuroscience and imaging research center.</i></p> <ul style="list-style-type: none"> • Decreased stitching time from 13.7 sec/image-pair to 1.8 sec/image-pair, using OpenCV and OpenMP on GPU cluster, on the Stitching Multi-Terrabyte ssTEM Image Data project. <p>Weizmann Institute of Science, Rehovot, Israel SUMMER 2014 International Summer Science Institute (ISSI) [Advisor: Prof. Roei Ozeri] <i>ISSI is an international internship for natural sciences and math. I worked in the Trapped Ions Lab.</i></p> <ul style="list-style-type: none"> • Developed data visualization to study ultra-cold atoms in a laser-cooled Magneto-Optical Trap.
PUBLICATIONS	<hr/> <ol style="list-style-type: none"> 1. R. Rinberg, N. Agarwal. <i>Privacy when Everyone is Watching: An SOK on Anonymity on the Blockchain</i>. ePrint. 2. A. Tamaskar, R. Rinberg, S. Chakraborty, B. Mishra. <i>Creolizing the Web</i>. arXiv:2102.12382 . Research from my work at NYU with Professor Bud Mishra. <hr/>
ARTICLES	<hr/> <ol style="list-style-type: none"> 1. R. Rinberg and A. Nichani. <i>Improvements and Analysis of Private Ensemble-Based Federated Learning</i>. Pre-Print. 2021. 2. R. Rinberg. <i>Resources for Public-Interest Technology</i>. Medium (self-published). 2020. Comprehensive list of resources for working in public-interest technology. Link. 3. R. Rinberg. <i>How to Use Docker to Learn Jenkins</i>. Medium (self-published). 2020. Educational article about how to learn new software tools. Link. 4. R. Rinberg. <i>Jell-O Brains and DNA: High School Students Launch Innovative STEM Program</i>. Scientific American. 2014. Invited article in 'Budding Scientist' series describing work leading Project BEST. Link. <hr/>
TEACHING	<p>NYU - General Physics I and II Tutor SEPTEMBER 2017 - MAY 2018</p> <ul style="list-style-type: none"> • Tutored physics courses on classical mechanics and electricity & magnetism. <hr/>
AWARDS, MEMBERSHIPS, CONFERENCES	<p>Workshop on DP and Statistical Data Analysis (Toronto, ON) SUMMER 2022</p> <p>Differential Privacy Summer School (Boston, MA) SUMMER 2022</p> <p>Presidential Honors Scholar (NYU) 2015 - 2018</p> <p>Dean's List (NYU) 2014 - 2018</p> <p>Sigma Pi Sigma (Physics Honor Society) (NYU) INDUCTED 2018</p> <p>HPC for Undergraduates - Conference Scholarship for SC'17 FALL 2017</p> <p>DURF & Research+ for Housing and Stipend (NYU) SUMMER 2017</p> <p>University Leadership Honors Course (NYU) SPRING 2017</p> <hr/>
LEADERSHIP	<p>Project BEST (Building Excitement for Science and Technology) 2011 - 2014 CFO and Co-founder <i>Project BEST is a non-profit which develops after-school STEM programs for middle school students.</i></p> <ul style="list-style-type: none"> • Fundraised and grew organization to 25 chapters across 3 states, reaching 3000+ students. • Led two full-day STEM programs for 100+ students, and co-led team of 20 volunteers. <hr/>
SIDE-PROJECTS AND SERVICE	<p>Ouster Community Work 2018-2020</p> <ul style="list-style-type: none"> • Advocated management to institute paid volunteer-day and donate \$6k to 6 public-interest orgs.