

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, using 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 and ran simulations. Publication on arXiv.

WORK EXPERIENCE

Ouster, San Francisco, CA JUNE 2018 - JULY 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 & deployed C++ algorithms for real-time predictions about dangerous driving.
- 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.

- 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.
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INTERNSHIPS

University of Toronto, Toronto, Ontario MAY 2022 - SEPTEMBER 2022
Privacy in Machine Learning [Advisor: Prof. Nicolas Papernot]

- 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](#)).

Hong Kong University for Science and Technology, Hong Kong SUMMER 2016
Research in Industrial Projects for Students (RIPS-HK) [Advisor: Dr. Avery Ching]

RIPS-HK is an REU with HKUST and an industrial sponsor.

- 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.

Janelia Research Campus, HHMI, Ashburn, VA SUMMER 2015
Scientific Computing Group [Advisors: Dr. Khaled Khairy and Dr. Sean Murphy]

Janelia Research Campus is a neuroscience and imaging research center.

- 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.

Weizmann Institute of Science, Rehovot, Israel SUMMER 2014
International Summer Science Institute (ISSI) [Advisor: Prof. Roei Ozeri]

ISSI is an international internship for natural sciences and math. I worked in the Trapped Ions Lab.

- Developed data visualization to study ultra-cold atoms in a laser-cooled Magneto-Optical Trap.

PUBLICATIONS

1. **R. Rinberg**, N. Agarwal. *Privacy when Everyone is Watching: An SOK on Anonymity on the Blockchain*. ePrint.
2. A. Tamaskar, **R. Rinberg**, S. Chakraborty, B. Mishra. *Creolizing the Web*. arXiv:2102.12382 .
 Research from my work at NYU with Professor Bud Mishra.

ARTICLES

1. R. Rinberg and A. Nichani. *Improvements and Analysis of Private Ensemble-Based Federated Learning*. Pre-Print. 2021.
2. R. Rinberg. *Resources for Public-Interest Technology*. [Medium](#) (self-published). 2020.
 Comprehensive list of resources for working in public-interest technology. [Link](#).
3. R. Rinberg. *How to Use Docker to Learn Jenkins*. [Medium](#) (self-published). 2020.
 Educational article about how to learn new software tools. [Link](#).
4. R. Rinberg. *Jell-O Brains and DNA: High School Students Launch Innovative STEM Program*. [Scientific American](#). 2014.
 Invited article in 'Budding Scientist' series describing work leading Project BEST. [Link](#).

TEACHING

NYU - General Physics I and II Tutor SEPTEMBER 2017 - MAY 2018

- Tutored physics courses on classical mechanics and electricity & magnetism.

AWARDS,
MEMBERSHIPS,
CONFERENCES

Advanced Master's Research Specialization	2022-2023
Workshop on DP and Statistical Data Analysis (Toronto, ON)	SUMMER 2022
Differential Privacy Summer School (Boston, MA)	SUMMER 2022
Presidential Honors Scholar (NYU)	2015 - 2018
Dean's List (NYU)	2014 - 2018
Sigma Pi Sigma (Physics Honor Society) (NYU)	INDUCTED 2018
HPC for Undergraduates - Conference Scholarship for SC'17	FALL 2017
DURF & Research+ for Housing and Stipend (NYU)	SUMMER 2017
University Leadership Honors Course (NYU)	SPRING 2017

LEADERSHIP

Project BEST (Building Excitement for Science and Technology) 2011 - 2014

CFO and Co-founder

Project BEST is a non-profit which develops after-school STEM programs for middle school students.

- 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.

SIDE-PROJECTS
AND SERVICE

Ouster Community Work 2018-2020

- Advocated management to institute paid volunteer-day and donate \$6k to 6 public-interest orgs.