Roy Rinberg

Contact Information

Email: royrinberg+CV@gmail.com **Location:** New York, NY
Website: `www.royrinberg.com`

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, PySyft, ROS, ELK Stack, Pandas, Jenkins, Artifactory, SQL, Web-scraping

Research Experience

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

- Memorization is a known attribute of modern machine learning; I research characterizing 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

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. Roee 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.

Teaching

New York University — September 2017 - May 2018
General Physics I and II Tutor

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

Awards and Memberships

Presidential Honors Scholar — 2015 - 2018
Dean's List — 2014 - 2018
Sigma Pi Sigma (Physics Honor Society) — Inducted 2018
HPC for Undergraduates Scholarship — Fall 2017

- Scholarship to attend International Conference for High Performance Computing, Networking, Storage, and Analysis (SC'17) in Denver, CO (32 out of 437 accepted)

Dean's Undergraduate Research Fund (DURF) and Research+ — Summer 2017

- Stipend and housing for research on computational linguistics.

University Leadership Honors Course — 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.
- Developed and led programs for two, full-day STEM events for over 100 students each, 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.

Arxiv Connections — August 2020

- Wrote a tool to scrape Arxiv and display co-authoring connections as a graph. Github Link.

Publications

1. 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 and N. Agarwal. *Privacy when Everyone is Watching: Anonymity on the Blockchain. A ZK-SNARKs and Privacy Coins Primer.* Pre-Print. 2021.
3. R. Rinberg. *Resources for Public-Interest Technology.* Medium (self-published). 2020.
   Comprehensive list of resources for working in public-interest technology. Link.
4. R. Rinberg. *How to Use Docker to Learn Jenkins.* Medium (self-published). 2020.
   Educational article about how to learn new software tools. Link.
5. 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.