

# Ayush Hariharan

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## EDUCATION

### University of California, Berkeley – College of Engineering

Berkeley, CA

- Major – B.S in Electrical Engineering and Computer Science

GPA – 3.96 | Graduation – May 2023

Activities – Quant for Fintech at Berkeley. Data Consultant for Vivensity.

## WORK EXPERIENCE

### Jenova Valuation Inc

New York City, NY

Machine Learning Intern

Jun 2021 - Present

- **Stock Prediction Model:** Preprocessed training data and built ML models for regression including Random Forest and Multilayer Perceptron. Trained models while optimizing for MAPE in both the present day and 3 month time frame. Developed an evaluation script to calculate VP Ratio, Price Correlations, Decile Differentials, and Percentile Differential.

### Blue Cloak LLC

Sterling, VA

Software Engineer & Consultant

Jun 2019 - Aug 2021

- **Keromatsu:** Mapped cyber ranges onto vCenter networks via a Flask application. Generated network visualization logs with pyVmomi and implemented a Redis-based task queue using celery and celery-flower to monitor ansible status. Developed CORE scripts for network emulation and performed unit-tests on queue functionality.
- **OSINT Security Analysis:** Developed a realistic employee profile with NLP models on vectorized tweets and utilized this model to bypass company security protocols. Applied clustering models on Creepy geolocation data and SocialMapper metadata to determine frequent travel locations, both local and abroad, for company employees.
- **Blockchain Data Storage:** Developed a Multichain pipeline to store network data collected by overhead drones. Installed peer clients on multiple Raspberry Pi 4 nodes and setup a consensus algorithm for blockchain peers to approve transactions. Experimented with Hyperledger Fabric as a secondary channel for storing the collected data.
- **Network Map Development:** Used Cytoscape to develop a GUI for company VMs. Added ability to change network traffic direction with a toggle and group select multiple machines. Created an info panel to manage machine settings.

## RESEARCH

### CAMPLPAD: Cybersecurity Autonomous Machine Learning Platform for Anomaly Detection

Published Author & Lead Programmer

Jun 2019 - Mar 2020

- **Publication Link:** <https://arxiv.org/abs/1907.10442> **Conference Link:** <https://tinyurl.com/ficc2020>

### A Quantum-Genetic Algorithm for Cybersecurity Budget Optimization

First Author & Independent Researcher

Aug 2018 - Jun 2020

- **Description:** Quantum Save applies genetic algorithms for knapsack optimization. With IBM's Qiskit Toolkit, qubit populations are initialized, measured, and manipulated. After implementing a 10% amplitude reduction and a disaster-algorithm at 5 generations, Quantum Save had a 49.2% improvement. With cybersecurity budgets, the algorithm had a  $\mathcal{O}(n)$  complexity and far outperformed existing allocation methods (as determined by histogram comparison).

## PROJECTS

- **Fantasy Football Lineup Generator (Aug 2021 - Pres):** Created a pipeline to predict fantasy production on user-inputted players which includes a web-scraping script for data collection, an ensemble ML regression model, and a lineup optimizer. Incorporated pipeline into a web application with React frontend and Flask backend
- **Visual Odometry (Jan 2021 - Aug 2021):** With Berkeley Underwater Robotics, using CNN's and SuperPoint architecture to determine optical flow of camera feed. Researching into ML-based (KLT algorithm) and geometric models for determining a submarine's relative velocity from video input and image analysis. Creating ML and deep learning models for SLAM.
- **Stock Analysis Tool (May 2021 - Jul 2021):** Used Streamlit to develop a web application for stock analysis with both a visualizer and an ML model-building environment. Visualizer includes a candlestick and moving average plotter. ML environment supports both traditional multi-layer perceptrons and CNNs. Link: [www.tinyurl.com/stock-predictor](http://www.tinyurl.com/stock-predictor).
- **Smart Contract for Sports Betting (Jan 2021 - Pres):** Used solidity to develop a contract to place bets and transfer funds from a linked MetaMask account. Worked with Provable Oracle to obtain game results and complete final payouts. Uploaded contract to the Robsten test network using Truffle and Infura. Integrated contract into a React Native Application.
- **Quantum Computing Projects (Mar 2019 - Aug 2020):** Implemented Grover's Algorithm and Shor's Factoring Algorithm on IBM Circuit Composer. Tested run time of both the IBM Q32 quantum simulator along with the Q5 and Q14 computers. Designed basic circuits demonstrating entanglement and superposition using IBM Qiskit.

## PROGRAMMING SKILLS

- **Languages:** Python, Java, Linux, HTML, SQL, Scheme, Javascript, IBM Qiskit
- **Technologies:** BeautifulSoup, AWS, Elasticsearch, TensorFlow, Scikit Learn, Django, Ansible, Redis, Celery, Flask, Quantum Genetic Algorithms, PyTorch, Docker, OSINT, React, Bootstrap, Cytoscape, Multichain.