# Joseph Li

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## Education

**Carnegie Mellon University** Pittsburgh, PA
B.S. in Computer Science; GPA: 3.91 Aug 2019 - May 2023

- **Coursework**: ML Systems, Intro to Deep Learning, Compiler Design, Structure and Design of Digital Systems.
- **Activities**: TA for Parallel Computer Architecture and Programming, Robotics Club, Robobuggy Chairman

## Experience

**NVIDIA Deep Learning Algorithms Intern** May 2022 - Aug 2022 (Remote)

- Integrated 8-bit floating point (FP8) arithmetic into BERT

**IBM Research Intern** May 2021 - Aug 2021 (Remote)

- Designed a novel algorithm using Ray RPC framework to efficiently train ML pipelines on cloud clusters. Resulted in 3.5x speedup in execution time. Outperforms memory usage of naive implementation by 50%.

**Bear Robotics Intern** Jul 2019 - Aug 2019 (Redwood City, CA)

- Optimized 3D vision pipeline using CUDA for uniform voxel downsampling.
- Improved global path planning for autonomous robot navigation in C++ and ROS.

## Projects

**Milk: C0 Compiler with Fork-Join Parallelization Extension** Aug 2021 - Dec 2021

- Implemented a version of the cilk_spawn and cilk_sync multithreaded parallelism routine. Utilized pthread library and cactus stack management routine. Integrated with compiler (written in Rust)

**Pystreaming: A Lightweight Python Package for Audio and Video Streaming** Dec 2019 - Present

- Developing Python package for low-latency real-time distributed inference across computer cluster. Leverages ZMQ messaging libraries, utilizes multi-core processing, and implements safe failure patterns.
- Extended project into the summer of 2020 while funded under an REU grant.
- Available for download through PyPI: https://pypi.org/project/pystreaming

**Warehouse Robots: GPU-Accelerated Training for Reinforcement Learning** Mar 2021 - May 2021

- Wrote custom CUDA kernels to simulate a multi-agent grid-world environment. Built environment that conforms to the API of the OpenAI Gym.
- 17x speedup in overall training runtime, 71x speedup in observation rendering, 103x speedup in environment stepping/reward generation.

**Dynamic Clustering Optimization For Multi-Center Federated Learning** Apr 2021 - May 2021

- Implemented a user clustering based federated learning algorithm that enables varying number of clusters and non-uniform client participation rates.
- Implemented and simulated effect of asymmetric client availability; implemented and simulated effect of weight sharing among clusters.

## Publications

**Detecting an Upward TGF from its Reverse Positron Beam** Jun 2018 - Aug 2018 (UC Santa Cruz)

- Determined the causes of gamma-ray flashes during thunderstorms through Monte Carlo simulation methods.
- Co-authored paper accepted to AGU (American Geophysical Union) Conference, 2018. Published to Journal of Geophysical Research, 2020.

## Awards

**USA Computing Olympiad Platinum Division** **AIME 4x Qualifier**
**USA Physics Olympiad Silver Medal** **Physics Bowl Top 10**

## Skills

**Languages:** Python, C++, C, Rust, SystemVerilog **Python Frameworks**: PyTorch, PySpark, Ray, Sklearn, ZMQ