# Irving Liang

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## Education

**Carnegie Mellon University** *Aug 2021 – May 2025*

*B.S. in Computer Science (Minor in Machine Learning and Mathematics), GPA: 4.0/4.0*

- **Courses:** Distributed Systems, Intro to Deep Learning (PhD), Intro to Machine Learning (PhD), Web Development, Linear Algebra, Probability, Statistical Inference, Mathematical Finance, Discrete Math, Multivariate Calculus
- **Skills:** Java, Python, C, C++, SQL, JavaScript, HTML, CSS, Pandas, PyTorch, Git, AWS, Docker, MongoDB, Shell
- **Awards:** Dean's List (High Honors), International Economics Olympiad Global Finalist (National Top 3)

## Experience

**Diderot** *May 2023 – Aug 2023*

*Software Engineer Intern*

- Prompt-tuned GPT-4 model with OpenAI API with data from past semesters to answer student questions interactively
- Proposed a iterative-prefix segmentation algorithm on post threads to standardize data for consistent prompt format
- Constructed a chat-bot tutor backend in Python with CoT and self-verification prompt tuning, embedding space search for few-shot learning, and quality check for adversarial injection, improving system safety and user experience
- Deployed the system on AWS and constructed RESTful API for communications between client interface and the server

**Robotics Institute - Carnegie Mellon University** *Mar 2023 – Present*

*Research Assistant with Prof. Jeffrey Ichnowski*

- Wrote Python scripts to configure BlenderCloth and generate compatible JSON files to automate experiment process
- Implemented new features for ParticleNeRF with Python and C++, including depth scaling, automated OBB finding, and real-time particle tracking, improving rendering results with a MSE of 0.18 on simulated particle trajectories

**Machine Learning Department - Carnegie Mellon University** *Jan 2023 – May 2023*

*Undergraduate Researcher with Dr. Chirag Nagpal*

- Researched on firm bankruptcy prediction using time-to-event analysis with neural networks based on corporate data
- Defined 2 types of event indicator to deal with data censorship and conducted data pre-processing and augmentation
- Designed training and evaluation pipeline with PyTorch and Scikit-Learn and conducted parallel grid search for hyper-parameter tuning on auton survival models, increasing prediction accuracy by over 5.8% than baseline models

**Computer Science Department - Carnegie Mellon University** *Aug 2022 – Present*

*Teaching Assistant of 15-210: Parallel and Sequential Data Structures and Algorithms*

- Led recitation and office hour for 200+ students on advanced algorithm design & functional programming in SML/C++

*Course Tutor of 15-251: Great Ideas in Theoretical Computer Science*

- Held weekly meetings with students on topics including automata theory, graph theory, and Monte-Carlo algorithms

**Human-Computer Interaction Institute - Carnegie Mellon University** *Aug 2022 – Dec 2022*

*Web Developer*

- Implemented an interactive web interface in HTML, CSS, JavaScript, and Vega to visualize performance of ML models

## Projects

**Distributed Search Engine** | **Java :** A large-scale text search engine supporting Boolean, BM25, and Indri retrieval models, with result diversification, query expansion, and SVM classifier to improve search result by 12% more relevant

**Concurrent Web Proxy** | **C++ :** A full-fledged web proxy that can process HTTP requests to servers and fetch content to clients, with multi-threading for concurrent requests and a dynamic cache to boost HTTP request by 60%

**MyTorch©** | **Python :** A custom deep learning library in pure NumPy with out-of-the-box usability, inspired by PyTorch, supporting MLP, CNN, RNN with gated recurrent units, and LSTM, with autodiff for efficient backpropagation

**Speech Recognition Neural Network** | **Python :** A LSTM-based model with LAS architecture for audio transcription, optimized with multi-head attention, Gumbel reparametrization, and Locked Dropout for a Levenshtein distance below 7