Wayne Zhou

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EDUCATION

Northeastern University - Master of Science in Computer Science — Expected Graduation - Dec 2025

University of Washington - Bachelor of Arts in Architectural Design — June 2016

WORK EXPERIENCE

Earth & Space Research (ESR) — June 2024 - Present

Machine Learning Engineer Intern | *Machine Learning System, Python, Data Engineering, Open-source*

- Developed a U-Net-based spatiotemporal **deep learning** system using **TensorFlow** and **Keras**, achieving a 64% reduction in Arctic sea ice concentration (SIC) prediction mean absolute error (MAE) for forecasts up to two months in advance
- Engineered robust **data preprocessing pipelines** for multi-source climate datasets (NASA, ESA, NOAA), handling complex NetCDF4 data structures and implementing data validation checks
- Conducted comparative analysis against existing methods (CNN, ConvLSTM, IceNet), demonstrating superior performance of sea ice concentration prediction in collaboration with oceanographers and atmospheric scientists
- Created geospatial visualizations using **Matplotlib**, effectively communicating complex scientific findings and model predictions

Beam Group Inc. — April 2024 - June 2024

Software Engineer Intern | *Full-Stack Development, Cloud Infrastructure, DevOps*

- Developed an end-to-end **web application** for employment analytics, driving 35% faster decision-making for case management teams through automated insights and recommendations
- Built a responsive **React.js** frontend and RESTful APIs using **FastAPI** with asynchronous operations, enabling seamless integration with a machine learning model; optimized backend to achieve 99th-percentile response times below 100ms
- Engineered an automated CI/CD pipeline using **GitHub Actions**, **Docker**, and **AWS** (EC2, S3, CloudWatch)
- Led technical discussions in **Agile** team meetings and contributed to engineering design docs following **SDLC** methodologies

PROJECTS & AWARDS

LLM-Enhanced Search System with RAG Architecture | *Information Retrieval, LLM, Vector Database*

- Architected a Retrieval-Augmented Generation (**RAG**) system using DataStax Astra DB as the vector store, achieving 89% improvement in search relevancy compared to traditional keyword-based search
- Leveraged **Azure OpenAI's** embedding model to generate high-dimensional vector representations of documents, enabling semantic understanding and contextual matching
- Engineered the entire workflow using **LangChain**/**LangFlow** framework, reducing development time by 65%

Ski Resort Lift Tracking System | *Ditributed Systems, Cloud Infrastructure, Java*

- Engineered a **distributed** tracking system for ski resorts processing 200K+ daily lift rides using **Java**, **AWS EC2**, and **RabbitMQ**
- Developed a **multithreaded** Java client with 32+ threads, achieving 99th percentile response times under 100ms.
- Designed a scalable architecture with **load balancing** across multiple EC2 instances, reducing message queue backlog by 90%
- Built data persistence layer using **MySQL** supporting complex analytical queries with <40 ms response time

Real-time Environmental Sensing Platform | *IoT Systems, Cloud, C++*

- Developed a real-time environmental **IoT** monitoring system using **Arduino** (C++) with multiple sensors
- Built a scalable serverless data pipeline on **AWS** (**API Gateway → Lambda → DynamoDB**) for processing 10,000+ daily sensor readings with sub-second latency
- Developed web dashboard using **React.js** to visualize real-time sensor data, enabling instant environmental insights and alerts

2x Hackathon Winner | *Northeastern University Hackathon (2023 & 2024)*

SKILLS

Programming Languages: Python, Java, C/C++, JavaScript/TypeScript, SQL, HTML/CSS
Frameworks: FastAPI, Flask, React.js, Node.js, Spring Boot
Cloud & DevOps: AWS (**AWS Certified Practitioner**), Azure, Docker, Git, CI/CD
Data Science & Databases: Pandas, NumPy, Matplotlib, PostgreSQL, MongoDB, DynamoDB, VectorDB
Machine Learning: PyTorch, TensorFlow, Keras, Scikit-Learn