

JUNWEN "JASON" WANG

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[github](#) | [linkedin](#)

EDUCATION

Ph.D in Physics

Virginia Tech

Aug 2019 - Present

Blacksburg, VA

Master of Engineering in Computer Science

Virginia Tech

Aug 2022 - May 2024

Blacksburg, VA

SKILLS

Programming Languages Python(Numpy, Pandas, scikit-learn) | C++ | Java | SQL | R | HTML/CSS | JavaScript
Skill NodeJS | AWS | docker | Kubernetes | REST | Transformers | TensorFlow | LLM

EXPERIENCE

Virginia Tech & Sandia National Laboratories

Aug 2022 - Present

Research Assistant

Blacksburg, VA / Albuquerque, NM

- Applied **machine learning models (NNPs, GNNs)** to improve force and energy predictions for complex molecular systems, achieving a **15-25%** increase in accuracy for rod-shaped particle interactions.
- Designed and implemented custom **geometric descriptors** and **feature extraction pipelines**, reducing feature dimensionality by **28%** while maintaining model accuracy, leading to **20%** faster training times on DFT-based datasets.
- Developed and optimized ML models using **TensorFlow** and **Python** libraries, integrating them into the LAMMPS (**C++**) simulation framework, which led to a **32%** improvement in computational efficiency.
- Processed and curated over **1,000 high-quality training samples** from quantum mechanical simulations, focusing on enhancing generalization to diverse configurations using techniques like **transfer learning** and **hybrid force fields**.

Virginia Tech

July 2024 - Present

Research Assistant

Blacksburg, VA

- Processed over **100 hours of surgical videos**, creating an annotation framework for identifying tools and predicting surgical steps, **improving model labeling efficiency by 32%**.
- Trained **computer vision models** to detect anatomical structures and surgical instruments in video frames, **achieving over 90% accuracy in instrument detection and 88% accuracy in surgical step prediction**.
- Applied advanced image processing techniques, including segmentation, tracking, and object detection, **reducing manual annotation time by 24%**.
- Leveraged libraries such as **OpenCV** and **vision transformers** for object detection and segmentation modeling, **improving object detection performance by 13%**.

NOTABLE PROJECTS

Fine-tuning LLaMA 3 for Financial Sentiment Analysis [\[Github\]](#)

- Implemented **QLoRA** fine-tuning of **LLaMA 3** 8B language model, improving sentiment classification **accuracy from 37.1% to 86.4%** across 900 financial news headlines
- Engineered efficient training pipeline using 4-bit quantization (NF4) and parameter-efficient fine-tuning, **reducing GPU memory usage by 60% (from 16GB to 6GB)** while maintaining full 8B parameter model performance
- Developed custom inference pipeline capable of **real-time sentiment analysis** with 2.5 predictions/s throughput

AI Image Generation with DALL-E API and MERN Stack [\[Github\]](#)

- Developed a full-stack AI-powered image generation web application using **MERN (MongoDB, Express, React, Node.js) stack**, handling **100+ concurrent users** with a seamless UX.
- Integrated **OpenAI's DALL-E API**, enabling the generation of **1024x1024 AI-generated images** in under **3 seconds per request** and processing **1000+ API requests per month**.
- Designed and deployed a **scalable backend on AWS (EC2 + S3)**, implementing caching strategies to optimize performance and **reduce API costs by 28%**.

Marine Corps Community Services (MCCS) Dashboard [\[Github\]](#)

- Designed and implemented the backend infrastructure using the **LAMP stack (Linux, Apache, MySQL, PHP)** on **AWS Lightsail**, resulting in a **23% reduction in deployment time** for the web application.
- Managed database configurations in **MySQL**, optimizing performance and storage capacity for handling over 107GB of data, leading to a **38% improvement in query response times**.
- Developed a responsive, user-friendly interface using **Bootstrap** and implemented **D3.js** for interactive data visualizations, allowing users to easily compare over **50 stores** and analyze vendor ratings.

SELECTED PUBLICATIONS

- Wang, J** Seidel, G. and Cheng, S. "Analytical Interaction Potential for Lennard-Jones Rods."
- Wang, J** and Cheng, S. "Integrated Lennard-Jones Potential between a Sphere and a Thin Rod"
- Wang, J** and Cheng, S. "Integrating Machine Learning Potentials with Geometric Descriptors for Enhanced Molecular Dynamics of Rod-Shaped Particle Systems." (In preparation)