

JASON JUNWEN WANG

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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 | MATLAB
Technologies AWS BS/EC/EC2/ELB | Azure | React.js | Docker | REST APIs | Spring | AJAX | Full stack | DOM

EXPERIENCE

Virginia Tech & Sandia National Laboratories

Aug 2019 - Present

Research Assistant

Blacksburg, VA / Albuquerque, NM

- **Physical Model Development:** Designed an innovative physical model to solve complex challenges in rod-shaped particle systems, achieving an average 30% improvement in simulation accuracy compared to previous models.
- **Software Enhancement in C++:** Managed the project using GitHub for version control and contributed over 3000 lines of code to the LAMMPS (Large-scale Atomic/Molecular Massively Parallel Simulator) software by developing and integrating new rod-shaped features.
- **Performance Optimization:** Conducted programming for performance optimization on parallel computing systems. Incorporated **GPUs** and **OpenMP** for further parallelization within **MPI-assigned** subdomains, cutting runtime by 90%.

Virginia Tech(Video-Based Evaluation System for Surgical Procedures)

Aug 2024 - Present

Research Assistant

Blacksburg, VA

- Process surgical videos to create an annotation framework for identifying tools and surgical steps.
- Train CV models to detect anatomical structures and surgical instruments in video frames and predict surgical steps.
- Apply image processing techniques including segmentation, tracking, and object detection.
- Leverage libraries such as OpenCV and vision transformers for object detection and segmentation modeling.

NOTABLE PROJECTS

Marine Corps Community Services (MCCS) Dashboard

Jan 2024 - June 2024

- Designed and implemented the **backend infrastructure** using the **LAMP stack (Linux, Apache, MySQL, PHP)** on **AWS Lightsail**, which facilitated quick deployment for the web application.
- Managed database configurations in **MySQL** to ensure efficient data storage and retrieval, overcoming challenges in handling large datasets by optimizing the system's performance and storage capacity.
- Utilized **Bootstrap** for creating a responsive, user-friendly interface, and implemented **D3.js** to develop interactive data visualizations that allow users to easily compare stores and analyze vendor ratings.
- Contributed to the design and integration of **machine learning** models for forecasting inventory needs and detecting shrinkage. Applied data cleaning techniques to the over 1.07GB dataset. Enabling MCCS to address this issue and drive data-driven decision-making and process improvements.

Real Time Gender and Age Detection with OpenCV

Aug 2023 - Dec 2023

- Employed **OpenCV's** Haar cascades and Dlib's HOG-based face detector, achieving 95% detection accuracy.
- Trained **deep learning** models(CNN) on the Adience dataset with over 26,000 images, covering 8 age groups and 2 gender classes.
- Implemented real-time prediction with webcam integration, processing at 15 frames per second (FPS).
- Performed image normalization, resizing, and augmentation, improving model accuracy by 12%.
- Used **VGG16** and **ResNet50** for transfer learning, resulting in 90% accuracy for gender and 85% for age predictions.

Prediction Molecular Properties using Graph Neural Networks

Jan 2024 - June 2024

- Led a project on leveraging **Graph Neural Networks (GNNs)** for accurate prediction of crucial molecular properties (Absorption, Toxicity, Solubility) essential for drug development, utilizing TOX21, BBBP, and ESOL datasets.
- Engineered and compared various GNN architectures, including MPNN, GCN, GraphSAGE, and GAT, alongside a MOL2VEC embedding technique, to establish a superior model for molecular property prediction.
- Conducted comprehensive analyses to visualize and identify critical molecular substructures influencing drug properties, leveraging machine learning to decode complex chemical data into actionable insights.

SELECTED PUBLICATIONS

- **Wang, J** Seidel, G. and Cheng, S. "Analytical Interaction Potential for Lennard-Jones Rods."(2024).
- **Wang, J** and Cheng, S. "Integrated Lennard-Jones Potential between a Sphere and a Thin Rod."(2024).
- **Wang, J** Seidel, G. and Cheng, S. "Simulation of Rod using LAMMPS: An Implementation of the Rod Model and Its Applications." (In preparation)