Alex Liu

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Education

Purdue University **May 2026**

Bachelor of Science in Computer Science GPA: 3.8

- Relevant Coursework: Data Structures and Algorithms, Software Engineering, Systems Programming, Introduction to the Analysis of Algorithms, Computer Architecture, Programming in C, Discrete Math, Object-Oriented Programming

Experience

GE Transportation, a Wabtec Company May 2024 - Aug 2024

Software Engineering Intern *Erie, PA*

- Engineered MVP development of a management system to collect and transmit event recorded data to customers.
- Deployed an advanced diagnostic tool to automate SSH connections to onboard OSs of over 2000 locomotives daily, enabling real-time confirmation and retrieval of cellular connection statuses to enhance operational efficiency.
- Designed and implemented an automation tool in Python for daily data collection from onboard edge devices via SFTP, significantly improving data retrieval efficiency and accuracy.
- Reduced execution runtime by 97% through integration of data transfers to cloud-based servers, streamlining operations and completely replacing manual retrieval.

FLEX Lab Aug 2024 - Present

Machine Learning Research Intern *West Lafayette, IN*

- Enhanced wearable triboelectric sensor technology to improve speech recognition for vocally impaired individuals.
- Processed and analyzed 700+ hours of multimodal audio data in Python, employing t-Distributed Stochastic Neighbor Embedding (t-SNE) segmentation techniques to detect word frequency and phonetic variations.
- Parsed sensor vibrations at 95% accuracy by developing a deep learning model using transfer learning with CNNs.

Nationwide Jan 2024 - May 2024

Data Science Intern *West Lafayette, IN*

- Constructed the Pricing Impact Estimator (PIE) through a suite of predictive models, aimed at optimizing car insurance pricing strategies from proposed premium and reducing errors in rate estimation.
- Utilized advanced regression models for robust predictions, validated with MSE and Cross-Validation techniques, demonstrating 97.8% stability in premium rates across 13 quarters of empirical data.
- Developed quote-to-policy data processing workflows with Polars, implemented using historical data analysis.
- Leveraged AWS tools including S3 and EC2 to enhance data storage and computational scalability.

Purdue University Aug 2024 - Present

Teaching Assistant - CS 19300 *West Lafayette, IN*

- Designed a comprehensive course curriculum and lecture materials instrumental in teaching over 900 students.
- Managed and conducted weekly office hours for 40 students providing personalized guidance and support.

Projects

Nighttime Semantic Segmentation | *Python, Data Augmentation, Domain Adaptation*

- Constructed an instance-level data augmentation method for semantic segmentation, improving nighttime pedestrian recognition by 4.52%, outperforming state-of-the-art benchmarks.
- Implemented an image processing workflow that scanned, extracted, and augmented over 2,400 nighttime images.
- Trained and validated a domain adaptation deep learning model on augmented dataset, achieving consistent recognition improvements over 10,000 training iterations.
- Published and presented at the International Conference for Machine Learning and Soft Computing (ICMLSC).

Purdue Mosaic | *React, Socket.IO, Node.js, Express, Redis, Render*

- Pioneered a responsive collaborative pixel art whiteboard supporting 100+ simultaneous users while maintaining latency under 80ms by utilizing Socket.IO for seamless server-client synchronization.
- Engineered Redis-based buffering system to broadcast updates in batches, optimizing performance in high-traffic.

Technical Skills

Languages: Python, Java, C/C++, JavaScript, SQL, HTML, CSS, R, Godot
Frameworks/Libraries: React, Node.js, Express, MongoDB, Flask, NumPy, Pandas, Polars, PyTorch, Jest
Tools: AWS, Git, Docker, Redis, Vercel