Jeffrey Hoelzel Jr

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Work Experience

HURA Researcher | Pathogen & Microbiome Institute | Flagstaff, AZ (Hybrid) **August 2025 - Present**

- Designed and implemented prototype neural networks in PyTorch to predict antibody epitope locations within peptides across the infectome, adapting architectures from peer-reviewed research.
- Optimized a custom ESM-2 embedding generation library, reducing runtime by 50% through efficient batching, token management, and SLURM parallelization on NAU's Monsoon HPC cluster.
- Developed robust logging and embedding analysis tools to evaluate model correctness and embedding utility, improving data reliability and interpretability for downstream neural network model training.

Data Mining Researcher | NAU School of Informatics, Computing, & Cyber Systems | Flagstaff, AZ (Hybrid) **January 2025 - Present**

- Engineered a Python-based web scraping tool using Selenium WebDriver and BeautifulSoup to extract trail race data from UltraSignUp for research analysis.
- Optimized data mining and processing by implementing concurrent execution, achieving nearly a 50% performance improvement in efficiency.
- Resolved networking challenges by implementing dynamic retries, back-offs, and robust logging to track all errors, improving reliability.
- Engineered a data pipeline where mined UltraSignUp data was extracted and processed into spreadsheets using Pandas, ensuring clarity and organization for enhanced readability.
- Improved Open Street Mapping (OSM) data mining algorithm efficiency by implementing a dynamic coordinate batching algorithm, achieving a 48.5% reduction in the number of API requests to OSM.

Information Technology Intern | Cavco Industries, Inc. | Phoenix, AZ (In-Person) **June 2025 - August 2025**

- Engineered agentic task workflows including support ticket CRUD operations, and context-aware image handling that enabled seamless integration with ServiceDesk Plus.
- Designed and implemented a retrieval-augmented generation (RAG) pipeline that reduced average response latency by ~60% and consolidated 3+ API calls into 1.
- Developed a machine learning pipeline to classify and generate knowledge base articles from over 100,000 ServiceDesk Plus tickets, automatically generating and publishing them to Confluence for chatbot integration.
- Automated server-side cookie and session handling to maintain persistent chatbot context across multi-turn interactions.

Chatbot Researcher | NAU School of Informatics, Computing, & Cyber Systems | Flagstaff, AZ (Hybrid) **January 2025 - July 2025**

- Built a Campus Health chatbot to provide accurate responses to health-related and general inquiries, collaborating with a multidisciplinary research team to design and refine its functionality.
- Leveraged a multi-GPU cloud computer to dynamically test three different open source SLMs, allowing for less than 0.5 second responses from chatbots during research workshops.
- Led research workshops to analyze chatbot performance and improve its accuracy using collected data.
- Enhanced chatbot accuracy by refining the RAG pipeline through keyword extraction and context awareness, improving response relevance by ~35%.

Projects

Louie's Ratings | *Software Engineering (CS386)*

- Acted as project lead for a team of five, organizing sprint planning, delegating tasks, and facilitating weekly stand-ups to maintain cross-functional alignment.
- Collaborated on a web-based tool like Rate My Professor, designed to serve hundreds of NAU students with course and professor ratings, grade distributions, and withdrawal rates.
- Designed and developed the user login interface using React.js, improving password security by integrating bcrypt for password hashing.
- Integrated unit and acceptance testing using unittest module and Selenium WebDriver, automating testing in a live environment.

ArtemiS3 | *Senior Capstone Project (USGS Astrogeology Science Center & NASA)*

- Architected an intelligent, Dockerized search platform for NASA and USGS AWS S3 buckets using FastAPI to expose RESTful APIs, Boto3, Svelte, TailwindCSS, and NGINX, designed for CI/CD on AWS EC2.
- Served as project architect and team lead, coordinating client meetings, guiding technical direction, and ensuring milestone delivery.
- Engineered prototype search pipelines capable of filtering, sorting, and retrieving targeted objects across public S3 buckets, leveraging Meilisearch to accelerate query performance.
- Delivered technical feasibility presentations to NASA and USGS stakeholders and authored comprehensive technical documentation, including architectural specifications and conference poster materials.

Education

Northern Arizona University, Flagstaff, AZ **Expected Graduation: May 2026**

B.S. in Software Engineering with a Minor in Mathematics *Dean's List GPA: 3.85/4.00*

Coursework: Data Structures & Algorithms, Applied Statistics, Regression Analysis, Database Systems, Artificial Intelligence, Machine Learning, Software Architecture

Technical Skills

Languages: Python, JavaScript/TypeScript, C/C++, SQL, HTML, CSS

Technologies & Frameworks: React, Flask, FastAPI, Svelte, TailwindCSS, PyTorch, Scikit-Learn, Boto3

Databases: Firebase Firestore, PostgreSQL, SQLite

Tools & DevOps: Docker, Git, Slurm (Bash), AWS EC2 & S3, GC Compute Engine, High-Performance Computing (HPC), Meilisearch, CI/CD, Agile/Scrum Methods