

Aditya Velpula

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F1 STEM OPT Eligible

WORK EXPERIENCE

AI Engineer -- DAPSE Capstone | George Mason University | Backend & Data Feb 2026 – Present
NSI (National Security Innovations Inc.) Arlington, VA

- Designed and built the full backend for **DAPSE** (Arctic Policy Intelligence Engine), a RAG-based policy analysis platform processing **unclassified U.S. government** Arctic policy documents to deliver citation-backed legal intelligence for JAG officers.
- Engineered an async **Python 3.13 / FastAPI** backend with hybrid retrieval (**BM25 + FAISS** vector + **Exa.ai** neural web search), multi-query rewriting, and Reciprocal Rank Fusion across **25,565** searchable chunks and **4,377** policy objectives.
- Developed a three-tier **LLM verification pipeline** (OpenAI GPT-5 family) with automatic escalation and cost optimization, reducing inference costs by **~75-80%** while maintaining citation grounding and hallucination detection.
- Built data ingestion pipeline processing **1,192 policy sources** (519 government, 673 supporting) across **9 Arctic nations** with section-aware segmentation, parent-child chunking, deduplication, and OpenAI embedding generation (1,536-dim vectors).
- Implemented **8-dimension risk scoring**, cross-country conflict detection, and policy gap analysis for geopolitical scenario evaluation with automated JAG legal brief composition and decision-matrix generation.
- Designed **SQLite/FTS5 + FAISS** database layer, HMAC API authentication, rate limiting, defense-in-depth security guardrails, and integrated **Langfuse** LLM observability with per-request cost tracking and audit logging.

Graduate Teaching Assistant Aug 2025 – Present
George Mason University Fairfax, VA

- Selected by Professor Harry J. Foxwell to support 2 graduate sections in AIT-580, improving assignment clarity and reducing regrade requests.
- Mentored 50+ students on Python, SQL, R, and AWS Cloud; collaborated with faculty to enhance course materials through data-driven insights.

AI Engineer Nov 2023 – Jul 2024
Indgeos Geospatial Telangana, India

- Developed Python algorithms for large-scale geospatial image processing; established data-quality checks and feature engineering for ML readiness.
- Collaborated with version control (Git) and testing to ensure reliable data flow; designed and built the company website.

PROJECTS

Obesity Risk Analytics Using AWS Cloud Infrastructure (*Under the Supervision of Prof. Harry Foxwell*)

- Built end-to-end AWS pipeline (S3, RDS/MySQL, Glue) for CDC health datasets; performed SQL-based statistical analysis and Python/R visualizations (Dash, Seaborn, ggplot2).

U.S. Electricity-Rate Analytics: DIKW-Driven Exploration of IOU vs. Non-IOU Pricing

- Analyzed 320K+ records (2020–2023) using Python and SQL; applied regression and clustering to identify geographic and sector-based pricing differences.

Wildfire Risk Prediction Using Climate Data & Machine Learning

- Integrated MODIS/NOAA satellite datasets and trained Random Forest/XGBoost models, achieving AUC of 0.99 for high-accuracy wildfire risk classification.

SKILLS

- **Languages:** Python, C/C++, Java, SQL, R | **Software Engineering:** Algorithms, OOP, Testing, Debugging, Version Control
- **Cloud & Infrastructure:** AWS (S3, RDS, Glue), Azure (Data Factory, Databricks), FastAPI, SQLite, FAISS, GCP (Basic)
- **Data & ML:** ETL/ELT Pipelines, Data Modeling, Data Warehousing, Pandas, NumPy, PySpark, Scikit-learn, Feature Engineering
- **AI & NLP:** LLMs, RAG Pipelines, Vector Databases, Prompt Engineering, OpenAI API, Langfuse, Multi-Tier LLM Verification
- **Tools:** Git, Jupyter, Linux CLI, Power BI, Docker, Spark (Basics), Airflow (Basics)

EDUCATION

Masters, Data Analytics 2024 – 2026
George Mason University, Fairfax, Virginia

B.Tech, Computer Science and Engineering (Artificial Intelligence & Machine Learning) 2020 – 2024
St. Peters Engineering College, Telangana, India

CERTIFICATIONS

- **AWS Certified:** Generative AI Developer (**Professional, Early Adopter**) | ML Engineer (**Associate**) | Data Engineer (**Associate**)
- **AWS Certified:** Solutions Architect (**Associate**) | AI Practitioner (**Foundational**) | AWS Academy: Data Engineering, Cloud Foundations
- AI For Everyone | SQL (Advanced) Certificate