

DANIEL CRAWFORD

MS, MS*, MEng, MA

Lead/Principal Machine Learning Engineer & AI/ML Research Scientist

Deep Learning Engineer · Reinforcement Learning · LLMs · Agentic AI · Computer Vision

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PROFESSIONAL SUMMARY

Machine Learning Engineer and ML/AI Research Scientist with **11+ years** driving production AI/ML systems across generative AI, agentic architectures, computer vision, and deep reinforcement learning — from first principles through deployment at scale. Proven track record delivering **\$10M+ in measurable business outcomes** through hands-on **technical leadership of cross-functional ML teams** and rigorous research-to-production pipelines. Deep expertise in **LLM fine-tuning, retrieval-augmented generation, autonomous agent orchestration, multimodal learning, and simulation-based validation** across **defense, logistics, and enterprise AI applications**. Incoming **MS AI Engineering** candidate at **Carnegie Mellon University**; holds **five degrees** spanning ML, mathematics, linguistics, and industrial engineering — providing rare cross-disciplinary depth in **statistical reasoning, model behavior, and system optimization**. Equally effective as a high-impact **Staff/Principal IC** and as a **technical leader** shaping ML strategy, engineering culture, and executive alignment.

CORE COMPETENCIES

- Generative AI & LLM Fine-Tuning
- Agentic AI System Design & Orchestration
- Deep Reinforcement Learning & Policy Opt.
- NLP, RAG & Knowledge Graph Systems
- Research-to-Production ML Pipelines
- ML Team Leadership & Technical Mentorship
- Production ML Engineering & MLOps
- Computer Vision, Perception & Multimodal AI
- Simulation & Synthetic Data Environments
- Cross-Functional Stakeholder Communication

EDUCATION

Carnegie Mellon University	MS, AI Engineering (ECE)	2028
Georgia Inst. of Technology	MS, Computer Science — Machine Learning	2023
University of Pittsburgh	MA, Linguistics	2024
New Mexico State University	MEng, Industrial Engineering	2022
University of Pittsburgh	BS, Mathematics with Honors (BPhil)	2020

PROFESSIONAL EXPERIENCE

Dunedain Systems · Austin, TX (Remote) 2025 – Present

Founding Machine Learning Engineer

- Architected an ontological AI backend** integrating knowledge graph NER, temporal-spatial reasoning, and LLM fine-tuning — reducing mission planning artifact construction time by **4,000%** and enabling automated understanding of complex operational scenarios
- Co-architected a modular **LLM/NLP agentic ecosystem** with multi-stage reasoning pipelines, cutting prototype-to-deployment cycles by **35%**; designed cognitively grounded **agentic behavior patterns** supporting autonomous decision extraction in uncertain, adversarial environments
- Built and deployed a deep **U-Net geospatial segmentation model** identifying undocumented mobility corridors in zero-label terrain, optimized to process zoom-13 satellite imagery in under **15 seconds** with high-recall performance
- Developed **multimodal geospatial visualization software** fusing satellite imagery, traversability, hydrology, and urban structural features — achieving **4x improvement** in analyst processing throughput

Eccalon, LLC · Herndon, VA (Remote)

2025

Machine Learning Engineer

- Led end-to-end development and production deployment of **deep RL models for autonomous underwater vehicles (AUVs)** — designed a custom stochastic simulation environment enabling Monte Carlo-based agent validation under partial observability
- Built a **RAG-based risk identification engine** using graph-structured entity linking to surface foreign ownership relationships, improving investigative recall for high-risk entities by **45%**
- Co-developed an **LLM-powered multi-document contract analysis system** automating extraction and comparison workflows, cutting analyst review time by **70%**
- Designed and deployed an **OCR-to-structured-data pipeline** integrating vision models with NLP text extraction, boosting downstream entity-matching precision by **30%**

Elfur, Inc. · New York, NY (Remote)

2024

Founding NLP/LLM Engineer (Part-Time)

- **Architected as founding engineer** a resume-understanding NLP system combining summarization, NER, and semantic matching — increasing automation accuracy by **55%** and establishing the company's core product pipeline
- Designed end-to-end **ML/LLM pipelines** using MongoDB, OpenAI, Hugging Face, and LLaMA APIs, reducing experiment cycle time by **3×** and accelerating model iteration velocity
- Applied **cognitive-linguistic principles** to model architecture design, improving semantic clustering on human-interpretable hiring categories

Optimal Dynamics · New York, NY (Remote)

2022-2023

AI Engineer / Technical Lead

- Technical Lead for **5-member cross-functional ML/AI/Product Sales engineering team** delivering production deep RL systems for large-scale supply chain optimization — owned technical direction, sprint planning, and executive stakeholder alignment
- Drove **\$10M+ in client profit gains** through RL model improvements validated via offline simulation and real-world deployment feedback loops
- Automated ML workflows and **CI/CD deployment pipelines**, reducing analytics time-to-delivery by **85%** and establishing repeatable production ML processes at scale

Dept. of the Army — TRAC · Ft. Lee, VA

2020-2022

Data Scientist / Operations Research Analyst

- Led analytics and simulation research enabling **senior Army leadership** to evaluate operational effectiveness — built automated R analytics library reducing division-wide analysis time by **70%**
- Built an **NLP-based technical literature search and summarization engine**, accelerating research synthesis for military analysts by **3×**
- Designed and deployed executive-facing dashboards (R Shiny, Java) used by **Army General Officers** for real-time budget prediction and resource allocation
- **Mentored junior data scientists** and ORSA interns in ML methods, simulation design, and research reproducibility standards

SELECTED RESEARCH & PUBLICATIONS

Deep RL for Autonomous Vehicle Control — DDPG and actor-critic policy optimization with quaternion-based dynamics simulation for time-optimal satellite/vehicle orientation; Naval Postgraduate School collaboration

Automated Mammographic Breast Density Estimation — CNN-based medical imaging classification; research contribution to Lee & Nishikawa, Medical Physics, 2018; built training pipeline and optimized GPU/TensorFlow inference

Geospatial Object Detection & Population Dynamics — Stochastic simulation of migration through topologically-aware environments with neural spatial modeling; presented at University of Pittsburgh Graduate Exposition, 2024

Agentic ESG Scoring & Equity Evaluation — Multi-agent system for automated financial analysis, structured reasoning chains, and investment report generation

TECHNICAL SKILLS

AI/ML & Agentic Systems: LLM Fine-Tuning, Retrieval-Augmented Generation (RAG), Agentic AI & Multi-Agent Orchestration, Transformers, Deep Reinforcement Learning, CNNs, U-Net, Object Detection & Segmentation, OCR, NLP, Multimodal Learning, Time-Series Analysis, Simulation, Discrete Event Simulation

Frameworks & Libraries: PyTorch, TensorFlow, Keras, OpenCV, LangChain, DSPy, LightRAG, Hugging Face, scikit-learn, pandas, NumPy, Pydantic, Neo4j, gensim, spaCy, NLTK, R Shiny

Cloud & Infrastructure: AWS (CLI/GUI), GCP, Docker, CI/CD, PostgreSQL, MongoDB, Snowflake, dbt, ETL/ELT Pipelines, ONNX, TensorRT

Languages: Python (expert), SQL (expert), R, Java, MATLAB

Methods & Leadership: A/B Testing, Monte Carlo Simulation, Feature Engineering, Agile/Scrum, Technical Mentorship, Stakeholder Management, Cross-Functional Collaboration, Data Governance, Ethical AI