

Marc Mailloux

Senior Principal AI Software Engineer

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SUMMARY

Senior Principal AI Engineer with 7+ years building production ML, LLM, and RAG systems in secure enterprise environments. Technical lead for a sector-wide AI platform serving 800+ users with hybrid RAG and agent assistants. Deep expertise in LLM engineering (RAG, agents, MCP, fine-tuning), MLOps pipelines, and full-stack deployment. Recognized AI SME with seven Bravo Awards and multiple \$10K+ innovation grants. Active blockchain developer and open-source contributor in the Ergo ecosystem.

TECHNICAL SKILLS

AI / ML / LLM Engineering:

Python (expert-level), Retrieval-Augmented Generation (RAG) -- hybrid retrieval, vector + graph, LLM Frameworks -- LlamaIndex, LangChain, Open WebUI, vLLM, Model Context Protocol (MCP) -- server development, agent workflows, Fine-tuning & Alignment -- DPO, preference optimization, RL, Computer Vision -- CNN, LSTM, adversarial robustness, NLP / LLM -- job description analysis, reverse engineering, text classification, MLOps -- Docker, CI/CD pipelines, AWS SageMaker, model training & deployment, Vector Stores -- ChromaDB, Neo4j (graph + hybrid retrieval), HuggingFace -- models, datasets, model hubs

Infrastructure & Cloud:

AWS (EC2, SageMaker, MLOps pipelines), Azure (Azure OpenAI, cloud deployment), Docker / Containerization, CI/CD -- GitHub Actions, Jenkins, Agile DevOps

Data & Analytics:

SQL, Alteryx, Tableau dashboards & analytics, Automated ETL pipelines, Data modeling & feature engineering

Blockchain / Web3:

Ergo blockchain (ErgoScript, miner protocol, node operations), Mining pool infrastructure (50+ miners), API development & integration, Rust bindings (ergo-lib-python), Crypto payments & payment distribution systems, Demurrage / storage-rent distribution mechanisms

Developer Tools & AI Assistants:

Claude Code, Cursor, Lovable, Git workflow & code review, Linux / Windows environments

Open Source & Community:

sigmapy -- Python library for Ergo transactions (github.com/marctheshark3/sigmapy), FintelligenceAI -- RAG-based smart contract generator (github.com/marctheshark3/FintelligenceAI), Peer to Peer Podcast -- cryptocurrency content, Technical community building & live coding

EXPERIENCE

Senior Principal AI Software Engineer, Chief Engineer -- TAVA

Northrop Grumman | June 2026 -- Present | Remote (Palmetto, FL area)

- Chief Engineer for sector-wide RAG platform -- Open WebUI pipelines, hybrid RAG assistants, and MCP agent workflows powering internal AI-as-a-service
- Platform scale: 800+ active users across engineering and business divisions; LLM Wiki for team knowledge and use-case libraries
- Accelerating enterprise capability with generative AI by deploying domain-specific assistants and workflow-driven agents (RAG + agent patterns)
 - > 800+ active users on hybrid RAG and agent assistants

Principal AI Software Engineer

Northrop Grumman | July 2022 -- June 2026 | Remote (Palmetto, FL area)

- TAVA: Technical lead for custom AI chatbot platform using Open WebUI with Azure OpenAI endpoints; architected and deployed solution enabling domain-specific AI assistants for engineering teams
- Secured internal Spark innovation grant for CSV Model Context Protocol (MCP) server development; integrated MCP server with business unit datasets, enabling directors to query internal Excel data via conversational AI
- Developed AI agent workflows using MCP tools for automated report generation, reducing manual analysis burden
- Recognized as AI Subject Matter Expert for consistent project delivery exceeding stakeholder expectations
- GAIPD (2023--2025): Led deployment of commercial generative AI tools for proposal development in secure enterprise environment -- conducted vendor evaluations, facilitated Azure cloud deployments, ensured cybersecurity compliance, managed end-to-end lifecycle from vendor selection to production

- AIRGEL R&D: ML subject matter expert for geolocation estimation systems; developed LSTM prototype for confidence estimation; continued development of custom ML toolkit (IP) for rapid prototyping across RL and supervised learning; containerized architecture using Docker, deployed on AWS; developed MLOps pipeline for automated training and production deployment
- NLP for Critical Skills: Led team creating NLP system for job description analysis and skill identification; developed MLOps architecture for neural network deployment; experimented with NLP and LLMs for reverse-engineering job descriptions
- Managed \$250K innovation grant program; facilitated technology transitions to Space Sector
 - > [Managed \\$250K innovation grant program](#)
 - > [Multiple \\$10K Innovation Grants for R&D](#)
 - > [Seven Merit-Based 'Bravo' Awards](#)

Principal Systems Engineer / Systems Engineer & Data Scientist

Northrop Grumman | November 2019 -- July 2022 | Remote (Palmetto, FL area)

- OUTMATCH IR&D / Advanced AI: Designed deep learning models (CNN, LSTM) for radar classification and simulation-integrated ML; led adversarial studies and ML strategy advisory
- Built Python libraries, automated ETL pipelines, and Tableau dashboards for business unit analytics
- Deployed ML pipelines; mentored engineering teams; advised on ML strategy across the organization
- Facilitated technology transitions from research to Space Sector operations
- Managed \$250K innovation grant program; identified and funded high-potential R&D initiatives
- Utilized Agile, DevOps, CI/CD (GitHub, Jenkins), SQL, and Alteryx for analytics delivery
 - > [Managed \\$250K innovation grant program](#)
 - > [Seven Merit-Based 'Bravo' Awards](#)

Mining Pool Operator & Full-Stack Developer

Ergo Blockchain Ecosystem | November 2023 -- Present | Remote

- Sigmanauts Mining Pool (ergominers.com): Operating production mining pool serving 50+ active miners with custom-built infrastructure; developed payment distribution system supporting 20+ token airdrops in single transactions
- Implemented innovative demurrage distribution mechanism calculating and distributing storage rent based on weekly miner participation -- novel approach to pool economics
- Created comprehensive web ecosystem: main pool dashboard with custom APIs for real-time hashrate monitoring; mining profitability calculator (calc.ergominers.com); token holder analytics with export functionality
- Authored and secured funding for proposal to streamline mining pool deployment process
- FintelligenceAI: Built AI agent tool using RAG approach for automated smart contract generation from user documents; designed blockchain-agnostic architecture capable of generating code for obscure platforms; implemented research > formalization > code generation pipeline
- MCP Implementations: Developed dual MCP servers for Ergo Hack 10 submission -- Ergo node API integration for blockchain data queries and price data API with conversational interface
- Built e-commerce platform accepting ERG payments for AI chat credits; integrated with Open WebUI for seamless user experience
- SigmaPy: Developing modern Python library for Ergo blockchain transaction creation; leveraging Rust bindings (ergo-lib-python) to replace stale Python libraries; focusing on miner-friendly tooling and documentation
- Peer to Peer Podcast (youtube.com/@P2Pod): Co-host of cryptocurrency podcast covering Ergo ecosystem and broader crypto topics
- Building in Public: Regular live coding streams on X demonstrating transparent blockchain development process
 - > [20+ token airdrops in single transactions](#)
 - > [Mining profitability calculator deployed](#)
 - > [3rd Place, Ergo Hack 9: Miner Rights Protocol](#)

EDUCATION

University of Central Florida

Orlando, FL

- M.S., Modeling & Simulation, 2019
- B.S., Mechanical Engineering, 2017

AWARDS & RECOGNITION

- Intellectual Property & Good Engineering Award -- MultiArmed Bandit Framework
- Multiple \$10K Innovation Grants for R&D
- Merit-Based 'Bravo' Awards (seven awarded in total)
- Top Performer & Excellent Performer
- 3rd Place, Ergo Hack 9: Miner Rights Protocol

CERTIFICATIONS

- AWS Machine Learning Specialty Certificate
- Udacity Nano Degree -- AI Programming with Python, Deep Learning, Deep Reinforcement Learning

OPEN SOURCE & PROJECTS

- GitHub: github.com/marctheshark3 | github.com/The-Last-Byte-Bar
- Podcast: youtube.com/@P2Pod
- Web Projects: ergominers.com | calc.ergominers.com
- sigmapy: github.com/marctheshark3/sigmapy -- Python library for Ergo transactions
- FintelligenceAI: github.com/marctheshark3/FintelligenceAI -- RAG smart contract generation
- ergo-mcp: github.com/marctheshark3/ergo-mcp -- Ergo node + price MCP servers
- Miner Rights Protocol: github.com/The-Last-Byte-Bar/Miner-Rights-Protocol (Ergo Hack 9)