NATHAN SAMSON

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EDUCATION

University of Maryland - Baltimore County **August 2023 - May 2027**
Bachelor's, Computer Science *GPA: 3.9*

PROFESSIONAL EXPERIENCE

Capital One **Mclean, VA, USA**
Software Engineer Intern (TEIP) *June 2025 – August 2025*
- Built a serverless synthetic monitoring solution leveraging Python, AWS Lambda, and Fargate to execute automated health checks across production services, supporting both cron-based and API-triggered validation workflows.
- Architected containerized FastAPI applications with Docker, implemented comprehensive APM using New Relic, and streamlined deployment processes through AWS CLI automation and Serverless Framework configurations.
- Extended the platform with optional PagerDuty alerts, S3 HTML reports, and a lightweight results UI to speed incident triage and historical analysis.

University of Maryland - Baltimore County **Baltimore, MD, USA**
Undergrad researcher *September 2023 - Present*
- Co-authored PSMark, a distributed pub/sub benchmarking framework implementing 12 IoT workloads from 7 real-world datasets (smart cities, factories, healthcare) in Erlang to evaluate MQTT/DDS systems at scale. Submitted to IEEE Peercom 2026
- Co-authored and architected MQTT-DAP, a privacy-preserving MQTT extension enabling GDPR compliance through purpose-based access control. Modified Eclipse Mosquitto (60K LOC) with ~3K lines of C to enforce data subject rights (erasure, rectification, access) at the protocol level. Submitted to ACM SenSys 2026
- Designed and benchmarked 5 purpose-management approaches (broker-modifying and broker-agnostic) and 3 operational categories while maintaining sub-second latency for sensitive data operations.
- Built a Smart Campus occupancy prediction system integrating LiDAR sensors with ML models to forecast dining hall congestion. Engineered edge-cloud data pipelines with MQTT, optimized SQL/TSDB storage for high-velocity streams
- Developing an LLM-powered IoT simulation pipeline that generates synthetic meeting scenarios and multi-modal sensor data (temperature, CO_2, energy) to validate smart-building models.

OmniSyncAI **Remote**
Software Engineer Intern *May 2024 - July 2024*
- Engineered user-friendly CRM account setup using Node.js, React, and PostgreSQL, reducing onboarding time and increasing team invitations through AI-powered recommendations

PROJECTS & OUTSIDE EXPERIENCE

Conversational Finance Platform - *Link to project*
- A fine-tuned Gemini model translates chat into type-safe JSON. FastAPI with Pydantic validates the payload, maps it to domain commands, and shields the backend from prompt-injection.
- Architected a container-native microservice stack (FastAPI, PostgreSQL, React) that hot-swaps API versions without downtime and scales horizontally via Docker Compose.
- Crafted a bespoke lucide-react UI kit with accessibility-first hooks and dark-mode theming, delivering a modern, mobile-responsive experience for everyday banking tasks.

YouTube Sentiment Intelligence Pipeline - *Link to project*
- Built an asynchronous ingestion service that continuously streams and normalises comment data from the YouTube API, feeding a modular analysis backend.
- Engineered a hybrid sentiment engine that fuses BERT embeddings, scikit-learn ensembles, and prompt-refined reasoning via LLaMA Index to surface nuanced viewer reactions.
- Deployed an interactive creator dashboard that maps sentiment shifts to video chapters and release cadence, guiding data-driven decisions on thumbnails, titles, and content strategy.

Resume website
- Developed a responsive and visually appealing resume website using React and SCSS, hosted onvercel
- Implemented advanced features such as code splitting and progressive web app capabilities to enhance performance and user experience

SKILLS

Skills: Data Science, Flask, HTML/CSS, Java, REST APIs, Tensorflow, Python, Go, MATLAB, OpenCV, Data Analysis, SQL, Algorithms, AI, Machine learning, IoT, Data management, Prompt-engineering, Natural Language Processing (NLP), C/C++, JavaScript, Edge Computing, Linux, MQTT, Statistics, Docker, Kubernetes, AWS, Erlang, New Relic

ACHIEVEMENTS

- Nvidia Summer Bridge Program Participant
- Capital One Tech Summit Participant
- UMBC CSEE Research Day 2024 Best poster Award