# John Abrahams

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## EDUCATION

**University of Pennsylvania – Department of Engineering** Graduation: December 2027
**Computer Science Masters of Data Science**
Lehigh University – P.C. Rossin College of Engineering and Applied Science Graduation: May 2025
**Computer Science & Engineering Bachelor of Science** **GPA: 3.65 | Major GPA: 3.75**
Minor: Probability & Statistics
Honors: Dean's list Spring 2023 - Spring 2025
Related Coursework: Probability Theory (Ph.D course), Advanced Topics in GPU Architecture, Smart Devices, Advanced Topics in Operating Systems, Applied Machine Learning, Blockchain and Database Systems

## RESEARCH/PROJECT EXPERIENCE

**DJ Reinforcement Learning System** August 2025 - December 2025

- Developed a **distributed, wireless sensor network** using ESP32-S2 peripherals (environmental, audio, and thermal modules) to capture real-time crowd-engagement metrics and stream them to a Raspberry Pi controller.
- Independently scraped and cleaned **2,000+ DJ set data points** by developing a custom web-scraper and preprocessing pipeline for sequence learning and audio-metadata extraction.
- Designed, trained, and deployed a **2M-parameter GRU sequence-prediction model** to learn next-song transitions, integrating a **reinforcement-learning head** to adapt song selection based on live sensor feedback.
- Built a full-stack system linking embedded hardware**,** Python backends, and a DJ-facing GUI over WiFi, enabling real-time visualization of sensor data, RL decisions, and interactive control of the music-recommendation loop.

**APPLESEED OS** May 2024 - Present

- Designing and implementing a **custom WebAssembly runtime** in Go with OS-style process abstraction and pluggable scheduling policies, modeling workloads and resource management at the interpreter level to simulate real kernel behavior.
- Developing a **reinforcement learning–based scheduler (Double DQN)** that dynamically optimizes task prioritization and resource allocation under varying load conditions, outperforming traditional scheduling strategies in throughput and latency benchmarks.
- Pioneered parallel execution in WebAssembly by augmenting the existing interpreter to support multi-threaded execution, significantly improving performance in concurrent environments with Professor Michael Spear.
- Enhanced WASM function invocation and synchronization by implementing advanced spawnee/spawner logic and real-time synchronization with communication channels, enabling parallel function execution across multiple threads in Go.

**Capstone Document Search System** May 2024 - July 2025

- Engineered a **full-stack search engine** for a small startup for over **23,000 Dropbox documents** to enable fast, efficient content retrieval on **AWS**.
- Integrated document preprocessing and highlight extraction by parsing diverse file types and employing NLP models to segment and index content at the sentence level for granular search capabilities.
- Optimized content search and retrieval by implementing partitioned indexing, keyword-based sentence mapping, and integration with Dropbox's API to provide real-time document access and highlight matching for user queries.

## PROFESSIONAL EXPERIENCE

**New York Brain & Spine Surgery,** Software Engineer, White Plains, New York May 2025 – Present

- Building a production-style therapy chatbot using **LLaMA + FastAPI**, combining rule-based clinical workflows with LLM-generated responses.
- **Designing a configurable multi-agent system** supporting multiple mental-health conditions and rapid prompt iteration.
- **Designed and implemented backend APIs and application infrastructure**, enabling real-time conversational flows, safe state management, and rapid end-to-end feature iteration.

**The Quant Game,** Co-Founder May 2024 – August 2024

- Developing a **full-stack application** using React and Python, enabling users to create and simulate options trading strategies with real-time results and performance metrics
- Leveraged AWS services to store and manage 61 million financial data points, ensuring scalability, security, and high availability for data retrieval and processing

**New York Brain & Spine Surgery,** Research Associate, White Plains, New York May 2023 – August 2023

- Evaluated data imputation methods including the EM Algorithm and regression techniques for replacing missing data.
- Implemented logistic regression and support vector machines to determine their effectiveness in predicting patient outcomes after Anterior Cervical Diskectomy & Fusion in a cohort of 100 patients.

## TECHNICAL SKILLS

Programming & Software: Python, GoLang, C++, WebAssembly, C, AWS