John Courtney

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Education

University of Florida **August 2025 – May 2028**

Bachelor of Science in Computer Science | GPA: 3.7/4.0 *Gainesville, Florida*

Relevant Coursework: Data Structures and Algorithms, Discrete Structures, Natural Language Processing, Intro to Software Engineering, Linear Algebra for Data Science, Discrete Math, Math for Machine Learning

Experience

University of Florida Data Studio | *Research Assistant* **May 2026 – Present**

- Developed a two-agent VLM pipeline in Python to test cooperation on corrupted image views using K=0/1/2 prompts.
- Implemented reproducible image corruptions, API inference, caching, JSON retry logic, and transcript logging.
- Automated metrics and HiperGator SLURM runs for convergence, correctness, flip-rate, and loop analysis.

Computing Student Union | *Software Engineer, University of Florida* **May 2025 – Present**

- Implemented event creation, editing, updating, and deletion flows from Django backend to UI in TypeScript for campus-wide officer teams running 50+ campus events per semester.
- Integrated OpenAI's API with a JSON schema to enforce a consistent event data structure for database storage.
- Contributed calendar visualization and real-time update features to the administrator event-management portal.

Projects

MuAlphaTester | *Next.js, React, Supabase, Google Gemini API, PostgreSQL, Tailwind CSS* **March – July 2025**

- Designed the first adaptive math training platform for Mu Alpha Theta, with 20 participating schools and 300 students.
- Built a heuristic-based adaptive engine that selects questions from real-time per-topic and per-division performance.
- Fullstack infrastructure, backed by Supabase (PostgreSQL, Auth, Edge Functions, RLS) and Next.js 14 (App Router).

Student Performance Prediction Pipeline | *Julia, DataFrames, Jupyter* **April 2025**

- Developed a Julia pipeline that streams RIIID education logs in 10 parallel chunks and samples 1% of each, yielding 1M+ question-response records without loading the full file into memory.
- Engineered 11 per-student features (accuracy mean/std, response-time gaps, performance trend, explanation impact) and applied k-means with $k = 20$ to group students by behavior and engagement.
- Trained a regularized least-squares classifier ($\lambda = 0.01$) on an 80/20 split to predict above-median student performance, reaching 80.7% accuracy and 100% precision.

Agent-Memory | GitHub | *TypeScript, Node.js, SQLite (FTS5), Anthropic API, JSONL* **April 2026**

- Built a two-tier memory system for parallel coding agents, cutting redundant context use by 60% across 3+ sessions.
- Indexed 1,000+ curated entries via SQLite FTS5, delivering sub-10ms keyword search across shared agent knowledge.
- Designed an LLM consolidation pass notes classifier into 4 actions, compressing 100+ raw notes per session by 5x.
- Shipped a 10-command CLI with full session lifecycle and JSON output, letting agents manage memory autonomously without manual tracking.

Research Papers

[AAAI Workshop, Accepted] | *Plato's Cave: A Human-Centered Research Verification System* **April 2026**

- Matheus Kunzler Maldaner, Raul Valle, Junsung Kim, Tonuka Sultan, Pranav Bhargava, Matthew Maloni, **John Courtney**, Hoang Nguyen, Aamogh Sawant, Kristian O'Connor, Stephen Wormald, Damon L. Woodard
- Refactored agentic node verification from synchronous to asynchronous execution, delivering a 2.5x to 4x speedup.
- Deployed containerized services (Docker) on AWS ECS behind an Nginx reverse proxy on EC2 for centralized HTTPS routing via Cloudflare.
- Authored Taskfile automations to streamline local development setup, build pipelines, and deployment workflows.

Technical Skills

Languages: Python, TypeScript, JavaScript, C++, SQL, Julia, HTML/CSS, LaTeX
Web & Backend: React, Next.js, Svelte, Node.js, Django, Celery, Tailwind CSS
AI/ML & Data: PyTorch, NumPy, Pandas, SymPy, Streamlit, Plotly, OpenAI API, Anthropic API, Gemini API
Infrastructure: AWS (ECS, EC2), Docker, Nginx, SLURM, Git/GitHub, Taskfile
Databases: PostgreSQL, Supabase, Redis, SQLite (FTS5)
Concepts: LLM Agent Systems, Asynchronous Programming, Full-Text Search, Regression and Clustering, Full-Stack Development