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Matthew Brown

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Education

University of Virginia, Bachelor's in Computer Science **Expected Graduation May 2027**

- **Extracurriculars:** Software Game Development Club, Cracking the Interview Club, ColorStack
- **Coursework:** Computer Architecture, Data Structures & Algorithms, Discrete Mathematics

Work Experience

Frontend Software Engineer Intern, A&S AI | *TypeScript, React, Python, AWS, Redux, Vite* **Mar. 2025 — Present**

- Shipped **LLM/RAG** execution, file-processing, and credit-billing integrations via RTK Query into a unified workflow canvas into a unified workflow canvas, creating active enterprise deployments at **Heinz** and **Accordion Partners**, contributing to **$200K+** in funding.
- Engineered a three-phase async state machine (upload mutation, exponential-backoff polling, and mid-flight Redux-to-Formik source-of-truth handoff) with per-node polling that auto-restarts, enabling production-grade pipeline reliability across a **59**-module AI canvas.
- Architected Redux edge handlers cascading connection changes into individual node configs alongside **43** context-aware Yup schemas recalculating field requirements from upstream data, enabling dynamic workflow correctness across **59** node types for enterprise clients.

Full Stack Engineer, Flathead Special Education Cooperative | *TypeScript, React, Python, AWS, Redux, Vite, SQLite* **Sept. 2025 — Feb. 2026**

- Launched a microservices-style React SPA on AWS Amplify & CloudFront with WCAG adherence for a ~**17,250**-student district, cutting content turnaround from **5 days to 3 hours** by shipping AI-assisted admin workflows and a role-based content model.
- Built a guided UI with SQLite backend serving 395+ special education students and their families: **95% spam rejection** via server-side Amplify Functions validation, and **<60-second global content propagation** via automated CloudFront cache invalidation
- Built a resilient CI/CD pipeline with HTTPS, auto-SSL, CDN, and least-privilege access control, deploying via Amplify Serverless for on-demand scalability, and low latency, dropping P1 incidents to zero.

Full Stack Software Intern, Commence | *TypeScript, React, C#, Python, MongoDB, PostgreSQL, AWS, Node.JS* **Aug. 2022 — Jun. 2025**

- Developed a Python **ML pipeline** leveraging AWS Textract and computer vision to automate conversion of physical records to digital, reducing processing time by **2+ hours per 1,000 documents.**
- Diagnosed and fixed S3 data-handling and AWS Textract orchestration bottlenecks across administrative and database tools, cutting endpoint and page load latency by **~50%**; shipped SSR, OAuth, TLS across the admin layer to eliminate known security vulnerabilities.
- Refactored **500+** production files in a TypeScript web application to extract handwriting and typed text from standardized forms, adding type safety that eliminated all frontend type errors.

Game Development Engineer Intern, iD Tech | *C++, Unreal Engine, C#, Unity, Lua, Roblox* **Apr. 2025 — Jun. 2025**

- Taught software development to **100+** students across 10+ weekly workshops in 5 platforms: C++, C#, Lua, Unity, and Roblox.
- Raised student project completion rates by over **90%** across diverse age groups by created customized lesson plans that bridged theory with practice and scaffolding goals with rubrics parents and director could follow at home leading to an additional **$5k** in monthly sales.

Gameplay Engineer Intern, The Verse | *C++, Blueprint, Unreal Engine* **Apr. 2025 — Jun. 2025**

- Implemented 2 core gameplay systems in Unreal Engine C++ for a VR experience, iterating on prototypes with unit/integration test coverage and QA across the development cycle; Profiled gameplay performance using debugging tools to maintain a stable **<16ms** frame budget for the 60fps VR target

Projects

Accord | *TypeScript, React, Electron, Python, ONNX, HuggingFace Transformers, LangExtract, Claude/OpenAI API, Ollama* **mushakushi.com**

- Architected a **first-of-its-kind neuro-symbolic analysis** system: a 5-stage pipeline that converts fiction into auditable knowledge graphs for entity resolution, claim extraction, temporal reasoning, contradiction detection, and world-state hypothesis tracking.
- Solved the scale problem in manuscript analysis by reducing LLM context requirements from **100K+ token full-text reads to 100-500** token structured conflict packets, using a local-first runtime for core inference, graph construction, and deterministic reasoning.
- Built a TypeScript/React/Electron desktop platform with FastAPI runtime **LLM orchestration**, multilingual **NLI**-based claim extraction, evidence-linked diagnostics, and support for laude, OpenAI-compatible APIs, Ollama, and LM Studio.

Real-Time Rhythm Game | *TypeScript, C++/WebAssembly, React, PixiJS, Web Audio API, Chrome MV3, Electron* **mushakushi.com**

- Designed a fully client-side audio AI pipeline eliminating all backend infrastructure: C++/WASM DSP (FFT, onset detection, multi-hypothesis beat tracking, sub-50ms planning ticks via Emscripten) feeds **quantized transformer inference** and rhythm chart generation from raw PCM — zero cloud compute, zero manual authoring
- Shipped 2 in-browser **ML models** via Transformers.js and ONNX Runtime Web: quantized wav2vec2-base (768-dim) clusters per-phrase audio embeddings via **k-means++** for song-section detection; HTDemucs ONNX (~80 MB) performs 4-stem source separation for per-instrument **salience scoring** and real-time stem/mix audio crossfade
- Architected a 13-package Turborepo monorepo with zero DOM/platform API surface enforced at the TypeScript compiler level — identical engine, ML inference stack, and game logic ship to browser, Chrome MV3, and Electron with 451 tests across 17 packages and 0 runtime platform forks.

Technical Skills

Languages: TypeScript, JavaScript, C++, C#, Python, Java, Lua, SQL (PostgreSQL, SQLite), HLSL, HTML/CSS
Frameworks: React, Next.js, Node.js, PixiJS, Vite, Redux, .NET, Unity, Unreal Engine
Tools: WebAssembly, AWS (Amplify, S3, CloudFront), Docker, Git, Turborepo, GitHub Actions, Perforce, MongoDB