

JOHN HEDLUND-FAY

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| SUMMARY

NLP & AI Systems Engineer with 5+ years of software engineering experience across production search, secure workflow systems, and agentic LLM applications. After building core modules of Athium's Football Administration System, I completed a Master of Science in Computer Science with Speech and Language Processing, where I developed and published a RAG-based NL-to-SQL architecture for the same high-compliance football data domain. I now build LangGraph/FastAPI AI systems that carry that research back into production through RAG, tool orchestration, validation controls, and practical model-selection strategies.

| PROFESSIONAL EXPERIENCE

INDEPENDENT APPLIED AI ENGINEER | Athium Limited | Remote, US | Apr 2026–Present

Provider of the Football Administration System, the system of record for back-office administration across the English football pyramid.

- Returned to Athium on an independent contract after publishing MSc dissertation research on RAG-based NL-to-SQL for Premier League football data; now implementing research-derived AI workflows into the production Football Administration System.
- Design LangGraph/FastAPI-based agentic AI workflows coordinating retrieval, tool use, structured outputs, validation logic, and human-in-the-loop review for enterprise use cases.
- Evaluate RAG and agent architecture trade-offs using faithfulness, relevancy, latency, and cost metrics across LLMs, task-specific models, retrieval systems, and classical NLP/ML methods.
- Implement privacy and deployment controls for sensitive document workflows, including PII sanitization with Presidio/GLiNER, local or air-gapped inference patterns, and data-sovereignty constraints.

SOFTWARE ENGINEER | Athium Limited | Warwick, UK | Feb 2020–Aug 2024

- Built and maintained core modules supporting FA, Premier League, EFL, WSL, academy, fixture, registration, approval, and compliance workflows.
- Designed and implemented a new Clearing House API within the existing platform, translating FA/Premier League requirements into auditable transfer, approval, receipt, and sell-on workflows integrated with the broader administrative ecosystem.
- Replaced spreadsheet, email, and attachment-based processes with authenticated approval chains, role-based access controls, immutable receipts, and audit trails for time-sensitive administration, reducing fraud, dispute, and social-engineering exposure.
- Built site-wide search over the league data platform using BM25/k-NN retrieval to resolve entity ambiguity and surface high-precision results across 90+ clubs' records.

SOFTWARE DEVELOPER | Tactic | San Francisco, CA, USA | May 2018–Aug 2018

Creative technology studio building XR, AR, and interactive brand experiences.

- Rapidly ramped into a Unity/C# technology stack, developing business- and client-facing XR campaign features for interactive brand experiences including 19 Crimes and Jack Daniel's.

| PUBLICATIONS & RESEARCH

“A Context-Enriched NL-to-SQL Agent for Premier League Football Database Querying” | Published in the Proceedings of CSEAI 2026 (Presented)

- Developed a 400-question domain-specific NL-to-SQL benchmark over Premier League, FA, and IFAB rules to evaluate questions requiring both structured database reasoning and external regulatory knowledge.
- Improved Exact Set Match by 0.116 on average over the strongest Chain-of-Thought baseline, including a statistically significant 0.278 gain on the highest-difficulty regulation-dependent queries (McNemar’s test, $p < 0.001$).
- Benchmarked monolithic agentic RAG, Chain-of-Thought prompting, and decomposed retrieval-refinement pipelines, showing that modular decomposition improved semantic correctness while offering clearer production tradeoffs around token cost, auditability, debuggability, and failure isolation.

Full Article: jackhedlundfay.com/text-to-sql

| EDUCATION

University of Sheffield | Awarded November 2025

Master of Science, Computer Science with Speech and Language Processing — Distinction

University of Minnesota | 2019

Bachelor of Science, Computer Science — Artificial Intelligence and Big Data focus

| SKILLS

- **AI & NLP:** LangGraph, LangChain, RAG, FAISS, BM25/k-NN Retrieval, Embeddings, Prompt Engineering, Text-to-SQL, LLM Evaluation, PyTorch, Hugging Face, PEFT/LoRA
- **Software Engineering:** Python, FastAPI, PHP/Laravel, Java, TypeScript, Vue.js, Inertia.js, REST APIs, CI/CD, TDD, Git
- **Data & Infrastructure:** SQL, PostgreSQL, Docker, ETL Pipelines, Schema Design, AWS (EC2, Lambda, S3), Local / Air-Gapped Deployment
- **Evaluation & Safety:** RAGAS, LLM Evaluation, Faithfulness/Relevancy Metrics, Exact Match, Chain-of-Thought Baselines, Comparative Architecture Evaluation, Hallucination Analysis, PII Sanitization