

Margulan Baizhakyp

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EDUCATION

The University of Alabama

Tuscaloosa, AL

M.S. in Computer Science (Accelerated Master's Program)

Aug. 2027 – May 2028

- **Focus:** Distributed Systems, High-Performance Backends, and Scalable Microservices. **Incoming Graduate Research Assistant** (Expected Fall 2027).

The University of Alabama

Tuscaloosa, AL

B.S. in Computer Science

Aug. 2023 – May 2027

- **Relevant Coursework:** Graduate Algorithms, Data Science, Software Engineering, Database Management Systems.
- **Study Abroad:** Carlos III University of Madrid (Spring 2025).

PROJECTS

Last-Mile Delivery Engine | Go, Kafka, Redis, PostgreSQL, Next.js, Docker

Nov. 2025 – Dec. 2025

- Architected a **high-concurrency last-mile delivery matching system in Go**, utilizing **Goroutines** and **Kafka** to decouple customer order ingestion from shopper dispatch logic, ensuring sub-second processing during peak traffic.
- Implemented **geospatial proximity matching** using **Redis Geo**, enabling sub-200ms discovery of available shoppers within a 15km radius of store locations for optimized route assignment.
- Eliminated **double-dispatch race conditions** by engineering a pessimistic locking strategy (SELECT FOR UPDATE) in PostgreSQL, ensuring **atomic order claims** across distributed shopper instances.
- Designed a **custom Presence Protocol** using WebSockets and a Go-based simulator to synchronize shopper GPS state, maintaining active delivery sessions and reducing "disconnected state" errors by **40%**.

GeoScale | Go, AWS, Kafka, Redis, Uber H3, Deck.gl

Jan. 2026 – Present

- **Architected a microservices-based geospatial stream pipeline on AWS in Go** using Kafka to ingest 10k+ events/sec; decoupled analytical density tracking to maintain 99.9% availability during traffic spikes.
- **Optimized spatial sharding via Uber's H3 hexagonal indexing** and atomic **Redis Lua** scripts for O(1) aggregation; reduced frontend network overhead by 90% while maintaining sub-50ms end-to-end processing latency.
- **Developed a high-fidelity mobility simulator using Gaussian Mixture Models** to replicate "Retail Hotspots"; validated system resilience against data skew and "thundering herd" scenarios common in logistics.
- **Visualized real-time marketplace health with a Deck.gl/Next.js dashboard**, rendering 4,000+ active H3 cells with 3D extrusion to identify supply-demand imbalances and provide granular neighborhood-level insights.

EXPERIENCE

AI Research Assistant

May 2025 – Present

University of Alabama

Tuscaloosa, AL

- Engineered a two-stage **RAG pipeline** using **PostgreSQL** and pgvector to **troubleshoot and analyze** massive datasets, achieving a 40x increase in information retrieval speed **while maintaining internal documentation**.
- Developed a full-stack geospatial interface using **React** and **Mapbox GL JS** to sync conversational AI with real-time **PostGIS** spatial data via browser events.
- Optimized **LLM accuracy** to 4.7/5 by implementing a **semantic filtering layer** with OpenAI embeddings, significantly reducing hallucinations in specialized domain queries.
- Architected a hierarchical data ingestion system to process heterogeneous hydrological datasets, ensuring high-fidelity context for complex model synthesis.

Residential Advisor

Jan. 2024 – Present

University of Alabama

Tuscaloosa, AL

- Lead a community of 75+ students, managing crisis intervention and de-escalation for high-pressure situations.
- Organized 10+ programs per semester, increasing student engagement by **20%** via strategic resource allocation.

TECHNICAL SKILLS

Languages: Python, Go, C/C++, TypeScript, JavaScript, SQL (PostgreSQL)

AI & Machine Learning: RAG Pipelines, LLMs, PyTorch, LangChain, Vector DBs (pgvector, Neo4j)

Frameworks & Cloud: FastAPI, Gin/Echo, Node.js, React, Next.js, Azure, AWS, Docker, Kubernetes

Tools & Libs: Git, CI/CD, Postman, Mapbox GL JS, Redis, WebSockets (SSE), NumPy, Pandas