

Muhammad Hamza Riaz

Full Stack AI Engineer

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Forward-thinking Full Stack AI Engineer with 3+ years of expertise in developing scalable web applications and high-performance AI systems. Proficient in architecting robust full-stack SaaS platforms with a recent specialization in building advanced RAG pipelines and multimodal LLM applications. Proven track record of optimizing enterprise-grade systems, improving overall performance, and delivering secure, user-focused solutions using Next.js, FastAPI, and PostgreSQL. Passionate about cybersecurity, zero-knowledge security models, and bridging the gap between advanced cryptography and AI-driven applications.

Technical Skills

Languages: Python, JavaScript, Typescript, Bash, SQL, HTML, CSS, PHP

Frontend: Angular, React, Next.js, Tailwind CSS, Hero UI, Web Workers, GSAP, Framer Motion

Backend: Node.js, Express.js, Django, FastAPI, Flask, Laravel, Prisma, SQLAlchemy, REST APIs, Web Sockets

Databases: MongoDB, PostgreSQL, Redis

AI Engineering: LLM Applications, RAG Pipelines, BM25 Retrieval, Reranking, Cross-Encoders, Vector Search, AI Integrations

DevOps & Tools: Docker, CD/CI, Git/GitHub, Postman, Linux

SEO: Keyword Research, On-Page Optimization, Performance Optimization

Cybersecurity: PGP, Web Crypto API, Network Security, OSINT Experience

Soft Skills: Critical Thinking, Communication, Cultural Awareness

WORK EXPERIENCE

Full Stack AI Engineer | Bave Holdings LLC

June 2025 – Present

- **Implemented** core feature sets for enterprise-grade SaaS applications, focusing on delivering high-impact functionality and improving user workflow efficiency.
- **Designed** high-performance full stack applications using **Next.js** and **Node.js**, ensuring seamless user experiences for enterprise-grade deployments.
- **Designed** advanced AI-powered RAG pipelines with **pgvector** and semantic reranking, achieving high retrieval accuracy across complex vector datasets.
- **Developed** the integration of intelligent automation workflows and LLM orchestration, substantially reducing manual data processing overhead.
- **Streamlined** deployment cycles using **Docker** and **CI/CD** pipelines, significantly increasing deployment frequency while maintaining stable production environments.
- **Mentored** a cross-functional team of 5+ developers on AI best practices and modern frontend architectures, accelerating feature delivery and improving team efficiency.
- **Defined** the technical roadmap and strategic priorities for AI product lines, aligning engineering initiatives with core business objectives and driving product growth.

Backend / Full Stack Developer | Afryvo Analytics

January 2025 – June 2025

- **Developed** secure authentication and user management systems using **FastAPI** and **SQLAlchemy 2.0**, implementing fully asynchronous database logic for high-performance transaction processing.
- **Deployed** a robust JWT-based authentication layer with token rotation and **HttpOnly cookie** security, significantly mitigating common session hijacking risks.
- **Refined** account protection mechanisms with rate-limited OTP workflows, substantially reducing unauthorized login attempts and improving account recovery efficiency.
- **Managed** the design of scalable REST APIs, optimizing for concurrent request handling while maintaining sub-100ms latency.
- **Standardized** clean code practices and **Alembic** migration workflows, minimizing database-related deployment errors across the engineering team.
- **Leveraged** the **uv** package manager to optimize developer environments, significantly reducing local setup times and ensuring dependency parity.

Full Stack Developer | Information Technology Services

June 2023 – December 2024

- **Built** multiple web applications using **PHP**, improving overall system performance and enhancing user retention through UI/UX refinements.

- **Maintained** and enhanced specialized medical publication platforms, managing complex **XML-based data structures** and abstract indexing for academic journals.
- **Implemented** critical feature updates and content management workflows for healthcare-focused web applications, ensuring reliable access to medical research data.
- **Collaborated** on the technical maintenance of legacy systems, optimizing XML parsing logic and ensuring stable performance for high-traffic journal repositories.

PERSONAL PROJECTS

Dream Veil

- **Developed** a privacy-first, AI-powered dream interpretation platform using **Next.js**, **FastAPI**, and **PostgreSQL**, featuring a zero-knowledge "Blind Vault" architecture with **End-to-End Encryption (E2EE)** via the **Web Crypto API** (AES-256-GCM, PBKDF2).
- **Designed** a production-grade **6-Phase RAG Pipeline** implementing **Hybrid Retrieval** (Dense **pgvector** HNSW + Sparse **Postgres BM25**), **Reciprocal Rank Fusion (RRF)**, and semantic reranking via a local **Cross-Encoder model** (`ms-marco-MiniLM`).
- Developed a **Zero-Knowledge RAG** architecture that executes semantic vector matching on high-dimensional embeddings while discarding ephemeral plaintext, ensuring the server never persists unencrypted psychological data.
- **Built** real-time, low-latency AI interpretation streaming by natively mounting **Socket.IO over ASGI** within FastAPI, executing complex 4-phase cryptographic handshakes across REST and WebSocket boundaries.
- Integrated **Gemini 2.5 Flash** for deep multimodal psychological analysis and **text-embedding-004** for high-dimensional semantic pattern recognition, managed by a robust, **Redis**-backed intelligent API key rotation system.
- Designed a fault-tolerant, **5-Phase resumable migration state machine** allowing users to securely encrypt or decrypt bulk historical databases dynamically during network interruptions without data corruption.
- Utilized **SQLAlchemy 2.0** with fully asynchronous execution and **Alembic** migrations, accelerating complex vector distance queries and full-text searches for rapid retrieval.

Next PGP

- Developed **Next PGP**, a high-performance **PGP encryption** and secure messaging tool built as a **Zero-Knowledge PWA** using **Next.js**, **PostgreSQL (Prisma)**, and **OpenPGP** for client-side end-to-end encryption.
- **Designed** a multi-layer security system implementing **AES-256-GCM**, cryptographically secure **PBKDF2-SHA512**, and a **custom binary format** with **HMAC-SHA256** integrity checks and **DEFLATE** compression.
- Developed a secure backend featuring **probabilistic rate limiting** to reduce DB overhead, **HMAC-signed CSRF tokens** with timing-safe validation, and a high-availability **keyserver proxy** with automated failover logic.
- **Improved** cryptographic performance by implementing a dynamic **Web Worker Pool**, leveraging multi-core processing to parallelize heavy workloads across all CPU cores, maintaining a responsive UI during heavy processing.
- Designed a custom binary vault format with **HMAC-SHA256** integrity checks and **DEFLATE** compression, utilizing **IndexedDB** for secure local storage and encrypted cloud backups.
- Built a premium, responsive UI using **Hero UI (NextUI)** and **Tailwind CSS**, integrating full **PWA** capabilities for native-like offline functionality across desktop and mobile platforms.

Dimitrescu Wallpapers

- Developed a high-performance wallpaper gallery application using **Next.js**, featuring **PWA** support and a focus on immersive UI/UX.
- Implemented **Prisma ORM** for efficient data management and **Auth.js** for secure authentication, including an interactive user review system with rate-limiting.
- Created complex, fluid animations using **GSAP**, **Framer Motion**, and **AOS**, paired with **Lenis** for high-end smooth scrolling and micro-interactions.
- Enhanced SEO and performance using **JSON-LD Schema.org**, dynamic sitemap generation, and **Vercel Speed Insights**, achieving top-tier performance scores.
- Integrated **PWA** capabilities to provide a native-like immersive experience across devices.

EDUCATION

Bachelor of Science in Information Technology | *Virtual University*
Karachi, Pakistan

2024

Diploma in Software Engineering | *Aptech Pakistan*
Karachi, Pakistan

2023