

ZACHARY HUMES

Nashville, TN | humesze@gmail.com | (513) 383-4080 | [GitHub](#) | [LinkedIn](#)

SUMMARY

Systems engineer specializing in secure distributed infrastructure, real-time pipelines, and ML systems. Led architecture, product direction, and delivery at early-stage companies in security and medical imaging, shipping production systems under performance, regulatory, and reliability constraints. Named inventor on a provisional patent for cryptographic architecture.

EXPERIENCE

HyperSphere Technologies, Inc., Remote

Jan 2026 - Present

Lead Software Engineer

Early-stage security startup (3 engineers) building S3-compatible encrypted storage for enterprise and government customers.

- Shipped the Rust backend MVP in under 30 days as a part-time contractor, then brought the product to production readiness within 60 days total.
- Leading technical direction for a 3-engineer team across backend architecture, infrastructure, and deployment.
- Built the core product in Rust: a multi-tenant, S3-compatible storage proxy encrypting data at rest without external KMS. Owned data path design including streaming I/O, stateless processing, multipart transfer (removing a prior 9GB upload limit), and storage-layer decisions around persistence and metadata placement.
- Identified and replaced a non-NIST-compliant cryptographic design (plaintext secret handling, no thresholding) with a standards-based key derivation and lifecycle architecture; formally analyzed the legacy multiparty encryption scheme, generalized it to the N-participant case, and authored the provisional patent protecting the new design.
- Engineered a pipelined encryption system achieving 2–4 GB/s throughput (up from ~3 MB/s serial), fully saturating network bandwidth with hardware-accelerated crypto.
- Reduced deployment complexity ~1000x (process-per-tenant to single binary). Built Ansible playbook for automated deployment - production-ready on AMI in under 15 minutes.
- Built and shipped the enterprise admin console in React Native in 2 weeks, enabling multi-tenant vault management, RBAC, OIDC/JWT authentication, telemetry dashboards, audit log access, and secure inspection of encrypted storage targets.
- Built observability and operations tooling including Prometheus/Grafana telemetry, Splunk-compatible audit logging, and cloud infrastructure management across AWS, GCP, and Wasabi.
- Built CI/CD pipeline: linting, testing, coverage, RPM packaging, deployment, and vulnerability scanning (OWASP, supply chain).
- Authored technical architecture documentation for OEM and SBIR partner engagements, including trust-boundary models adopted by a partner for its own SBIR submission materials.

Thalasso Therapeutics LLC, Carmel, IN

Nov 2024 - Jan 2026

Founding Engineer, Lead Software Engineer

Medical device startup (3 direct reports) developing AI-enhanced imaging for intraoperative spinal surgery. Edge-deployed systems in clinical environments.

- Led development of a real-time fluoroscopy enhancement system. Chose edge deployment over cloud architecture to eliminate patient data exfiltration risk under regulatory constraints around PHI leaving hospital networks. Built a multi-stage cGAN inference pipeline that runs on OR hardware in seconds with zero cloud dependency.
- Built and owned a CT-free 3D spinal reconstruction pipeline (MVP in 2 months with one other engineer) that generates anatomical models from just two x-ray inputs. Applied operations research (interior point methods) to design an alignment algorithm. Reduced alignment time from 7 min to under 10 sec. The system reached near-clinical (millimeter) accuracy before the company changed product direction.
- Designed and built the synthetic data pipeline, producing paired 2D/3D medical imaging datasets. Wrote custom tooling for segmentation, projection, mesh generation, and perspective-matched rendering.
- Authored software documentation included in the company's FDA 510(k) eStar submission, covering validation design and risk-mitigation strategy.
- Navigated a product direction change that set aside two years of prior 3D reconstruction R&D. Managed a mixed engineering and research team, delivered three complete products in under three months.
- Initiated R&D on 3D reconstruction and perspective geometry for medical imaging. Designed system architecture and validation testbed for edge-deployed clinical devices. Reduced cloud compute costs 66% through GPU infrastructure optimization.

Rose-Hulman Ventures, Terre Haute, IN

Sep 2023 - Nov 2024

ML Intern, then CS Intern

- Developed a new GAN architecture for 3D human reconstruction, delivering a working product in under 2 months. Order-of-magnitude speedup on 3D registration systems. Administered Lambda Labs GPU cloud infrastructure.

EDUCATION

Rose-Hulman Institute of Technology

May

2024

B.S. Computer Science & Mathematics (Double Major) | GPA: 3.36 | Cum Laude | Merit Scholar

TECHNICAL SKILLS

Languages: Rust, Python, TypeScript, C/C++, SQL (PostgreSQL, SQLite, T-SQL)

Systems: Distributed systems, streaming pipelines, async (Tokio), storage data-path design, S3 APIs, edge deployment, crypto architecture

Infra/Security: AWS, Linux, Ansible, Docker, Prometheus, Grafana, OIDC, JWT/JWKS, AES-GCM-256, OWASP.

ML/AI: PyTorch, cGANs, 3D reconstruction, synthetic data generation, computer vision, real-time inference