

Joel Villarino

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Education

Rice University

Bachelor of Science in Computer Science and Bachelor of Science in Statistics
Minor in Data Science

Houston, Texas

August 2022 – May 2026
GPA: 3.95/4.0

Experience

Nextdoor

Software Engineering Intern

San Francisco, California

May 2025 – August 2025

- Shipped a production multimodal classification pipeline (OCR + Google Vision + LLM routing) processing 15k+ articles/day; improved classification accuracy by 30% (offline eval + A/B validation) and reduced manual deletion incidents.
- Built safe rollout + ops controls: sitevar-gated deployments with a killswitch, metrics for Vision/LLM failure modes, and end-to-end dashboards for filtering outcomes and processing completion.
- Eliminated a major SQL bottleneck by rewriting a high-cost query path; cut compute from **5 CPU-hours/day** (~5% of cluster load) to under **1 minute** and reduced end-to-end article latency.
- Deployed an embedding-based RSS deduplication and canonicalization service that self-heals 301 redirects and verifies URL shifts.
- Implemented real-time intent classification for Nextdoor's RAG chat; routed tasks via GraphQL + workers and surfaced contextual actions.

Paycom

Software Development Intern

Grapevine, Texas

May 2024 – August 2024

- Built an internal **iOS** prototype in **Swift** integrating ATS APIs; implemented job search and candidate detail flows.
- Developed reusable **SwiftUI/UIKit** components and resume parsing/validation for recruiter-facing views.
- Produced wireframes and interaction specs to align iOS/Android behavior and speed iteration with stakeholders.

Rice University Teaching Assistant

COMP 412 – Compiler Construction, COMP 215 – Object-Oriented Programming

Houston, Texas

May 2024 – Present

- Held office hours, graded assignments, and guided students through register allocation and instruction scheduling.

RiceApps

Software Developer

Houston, Texas

June 2023 – Present

- Built a React-based impact calculator for United Way Houston that automated a previously manual reporting workflow.
- Led development of a React Native app for UT Health enabling clinicians to assign and monitor physical therapy workouts.
- Mentored 12 developers on React architecture and Git/PR workflow; improved review quality and standardized design patterns.

Projects

Autonomous Drone Herding System - Algorithmic Robotics & Control

- Engineered a **real-time multi-agent simulation** processing thousands of geospatial updates per frame; vectorized core computations with **Numba JIT** to achieve **50–130× speedup** over baseline.
- Designed a **hybrid neighbor-caching strategy** with movement thresholds, amortizing k-NN search cost and yielding 17–30% additional throughput for large-scale flock scenarios.
- Implemented **Server-Sent Events** for real-time state synchronization, replacing HTTP polling and enabling multi-drone coordination with sub-second latency.
- Led architectural separation of simulator and application layers; added 70+ tests enabling safe refactoring across backend codebase.

djprep - Open-Source DJ Audio Analysis Tool

- Built a **Rust** workspace for BPM/key detection and stem separation as an open-source alternative to Mixed In Key.
- Integrated **HTDemucs** via **ONNX Runtime** with provider selection across CoreML, CUDA, and DirectML; bounded-channel concurrency isolating **rayon** CPU work from GPU inference.
- Implemented Rekordbox XML import workaround for undocumented bug; FNV-1a track ID generation with positive-range masking for 32-bit signed integer schema compatibility.

MCP Agent Attestation Extension - Security Research

- Designed a **JWT/Ed25519** attestation extension for MCP with SPIFFE identifiers and JWKS distribution.
- Built dual **Python** (140 tests) and **TypeScript** (68 tests) implementations with MCP SDK integration, Redis-backed replay cache, and an 8-vector attack harness; wrote threat analysis covering limitations and provider adoption dynamics.

Activities

Mariachi Luna Llena (Guitar) · SHPE (Socials Chair) · HACER (College Rep) · Data Science Club (Mentor) · Edinburgh Abroad (Salsa/Bachata)

Courses

Algorithmic Robotics, Compilers, Concurrent Programming, Computer Systems, Algorithms, Optimization, Machine Learning, Bayesian Statistics

Skills

Languages: Go, C++, Python, SQL, Rust, Swift, TypeScript, Java, C, R

Frameworks/Tools: Docker, Git, GraphQL, React, SwiftUI, scikit-learn, TensorFlow, Django