Matthew Berger

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Senior Staff Rust Software Engineer working with Rust since 2016, with 5 years in production robotics. As founding software engineer at Hyphen, I built the food assembly platform from first commit to a full controls suite in 22 months, underpinning $35M+ in combined investment from Chipotle and Cava. The platform runs on a real-time async pub/sub message broker with sub-millisecond latency across 4+ years of fleet operation. Open source: 280k+ crates.io downloads (freecs, enum2 family) and the Nightshade game engine.

Work Experience

Hyphen (Culinary Robotics) Remote
Founding Software Engineer (promoted Senior, Staff, Senior Staff) *July 2021 – May 2026*

- Diagnosed scaling limitations in the legacy PLC system, led the technical pivot to embedded Rust, and pioneered RP2040 firmware with Embassy, creating the first Rust TMC5160 motor and AS5048A encoder drivers, proving Rust could meet real-time control loop requirements
- Architected and built the food assembly robotics controls software, with 1,000+ pull requests merged across 4 years, spanning low-level motor control to cloud service orchestration
- Designed and built MBTT, an async pub/sub message broker over TCP with cross-host bridging, length-prefixed postcard framing, and compile-time topic contracts via procedural macros, coordinating every distributed process across the industrial PC and RP2040 boards
- Implemented a `no_std` embedded MBTT client on Embassy with bounded static channels, integrating RP2040 firmware into the same pub/sub topology as the industrial PC
- Authored the controls suite as a multi-process system of state-machine-based servers corresponding to the robot equipment, communicating via typed command/event contracts over the broker, with coordinator servers orchestrating cross-subsystem behavior
- Shipped Hyphen Studio, a customer-facing Dioxus desktop application enabling operators to configure makeline layouts and parameters
- Built Hyphen Explorer (Bevy + egui) for real-time IPC visualization, debugging, and system control, achieving 100% adoption among Hyphen engineers
- Rewrote the TypeScript/GraphQL tablet portal in pure Rust with Leptos, connecting over WebSockets to a forwarding server that bridges broker topics out to web clients, enabling direct import of the same Rust contract types used across the controls suite
- Mentored 6 engineers new to Rust into productive contributors within 2 months each, enabling parallel platform development across multiple workstreams over the following year
- Built a custom Yocto Linux distribution and AWS Greengrass-managed OTA pipeline delivering firmware and software updates to makelines

Sierra Nevada Corporation Englewood, CO
Software Engineer III *May 2020 – July 2021*

- Developed C++/Rust aerospace imaging system capable of collecting and orthorectifying 5 GB/sec of pixel data during a flight
- Built asynchronous Rust simulator for unavailable flight hardware, saving 3 months on the project timeline

Scientific Games Reno, NV
Software Engineer *July 2019 – May 2020*

- Contributed to the GDK, Scientific Games' Unity-based engine powering casino game titles across their portfolio
- Migrated multiple shipped casino game titles from Unity's legacy GUI text system to TextMeshPro, modernizing typography rendering across the GDK portfolio

Hamilton Company Reno, NV
Software Engineer (Intern through Full-Time) *October 2014 – July 2019*

- Built safety-critical software that calibrates and operates liquid-handling medical robots, working in a cross-disciplinary environment with mechanical and electrical engineers
- Reduced calibration development from 2 months to 2 weeks by consolidating multiple applications into a single GUI and reusable plugin framework
- Developed the calibration application that a major customer, Illumina ($2M in Hamilton machine purchases), used to drive Hamilton's robot firmware
- Built software adapters bridging SiLA-compliant and non-SiLA lab instruments, expanding Hamilton's interop reach across third-party device manufacturers and driving instrument sales

Open Source

- **Nightshade**: data-oriented Rust game engine (200k+ LOC) featuring a custom render graph with sub-graph composition and resource aliasing for transient memory reuse, built-in editor, rapier3d physics, kira audio, gltf asset loading, scene graph, object picking, and Steam integration. Runs natively on DX12/Metal/Vulkan and in-browser via WebGPU (live demo: matthewberger.dev/nightshade)
- **Indigo**: real-time glTF renderer in Go drawing animated, skinned PBR scenes through a wgpu render graph with clustered lighting and image-based lighting. Runs natively and in-browser via WebGPU (live demo: matthewberger.dev/indigo)
- **pubsub-go**: topic-based pub/sub message broker and client over TCP in Go, built around a single state-owning goroutine that serializes all peer and subscription changes over a channel (lock-free on the hot path), with goroutine-per-connection readers/writers, bounded per-subscriber buffers that shed load under backpressure, and graceful shutdown. Length-prefixed JSON framing (github.com/matthewjberger/pubsub-go)
- **freecs** (48k+ downloads on crates.io): archetype-based ECS in Rust with zero unsafe code, Rayon-parallel system execution, sparse-set tags, deferred command buffers, and watermark change detection. The entire ECS is generated at compile time via a declarative macro. Design documented in the "Build your own ECS" 3-part series at matthewberger.dev/articles
- **enum2 macro family** (enum2str, enum2contract, enum2egui, enum2pos, enum2repr): derive macros for enum-driven design patterns with 230k+ downloads on crates.io
- **bamboo**: fast Rust static site generator with markdown + Tera templates, syntect-highlighted code blocks, live-reload dev server with incremental builds, RSS/Atom/sitemap, and responsive images. Powers matthewberger.dev
- **cameras**: cross-platform Rust library for real-time video frame pipelines across Linux, macOS, and Windows, with data-oriented design (explicit format negotiation, push-based frame delivery, zero trait objects). Ships with Dioxus and egui integrations.
- **scoop-nerd-fonts**: creator of the canonical Scoop bucket providing one-command font installation on Windows for Nerd Fonts and other open fonts (440+ stars)

Skills

Languages: Rust, Go, C#, C++, TypeScript, Python
Embedded & Real-time: RP2040, Embassy, `no_std`, low-latency systems, async Rust (Tokio), procedural macros, Yocto Linux
Distributed Systems: message brokers, HTTP/WebSocket, postcard, tracing/observability
Cross-Platform: Linux, macOS, Windows, Android, WebAssembly, Steam Deck, OpenXR
UI/Graphics: Leptos, Dioxus, egui, Bevy, wgpu, Vulkan, DX12, Metal, OpenGL, PBR rendering
Cloud/Infra: AWS, Pulumi, Greengrass IoT, Docker, GitHub Actions

Education

University of Nevada, Reno 2017
B.S. Computer Science & Engineering, Minor in Mathematics