Perry's Résumé - Security & Field Systems Engineering

Perry Kundert <*perry@kundert.ca*> +1-780-970-8148

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Abstract

Builder with decades of experience building field-deployable systems that run unattended where the network doesn't: a real-time SDR receiver recovering signals below the noise floor, a cryptographically secure multi-route SCADA protocol still carrying pipeline control traffic today, ruggedized satellite-connected video systems across Alberta oilfields, and a production AI service turning a large knowledge base into grounded answers at ~10x lower serving cost. Writes firmware, fabricates prototypes, and ships systems measured against captured field data — not synthetic benchmarks. (PDF, Text)

Skills

- **Field-deployable & embedded:** solid-state RTU firmware (hundreds of units, <1 defect per 10K LOC measured in the field); custom 1-Wire sensor board designed, fabbed and bench-tested; hardware bring-up, PCB debug, microcontrollers, assembly optimization; ruggedized deployment across remote sites.
- **RF, wireless & SDR:** real-time polyphase-filterbank receivers — a 25 Msps I/Q stream channelized into 125 x 200 kHz channels; production decoded SCM reports on 64 concurrent 900 MHz ISM-band channels, sustained; sub-sample timing and baud-rate estimation; per-channel noise-floor and SNR estimation; below-noise-floor recovery; satellite and degraded-link communications.
- **Secure & resilient communications:** LiveWIRE, a cryptographically secure, Reed-Solomon erasure-coded, multi-route SCADA protocol for marginal and hostile links; data diodes and unidirectional gateways; WebAuthn/passkey and Ed25519-signed systems; offline-tolerant, store-and-forward design.
- **Surveillance & video:** ruggedized satellite-connected monitoring, communications and video systems across Alberta oilfields — field-serviceable, diagnosable from hundreds of kilometres; a fleet of hundreds of remotely monitored Starlink-connected routers at remote sites with camera monitoring and on-PC AI video analysis (Blue Iris) triggering event reporting and annotated segments.
- **Software & AI:** Python (15+ yrs), C++ (25+ yrs), Rust (5+ yrs), C, assembly; production LLM service (BUCKy) grounding a ~100K-token knowledge base with ~10x per-query cost reduction (pre-computed KV cache, cloned per session), agent orchestration; APIs, databases, Linux, Docker, CI/CD, Nix reproducible builds.
- **Industrial & OT:** EtherNet/IP and CIP (author of `cpppo`), Modbus, DNP3, Ignition SCADA CI/CD with offline runtime simulation, large-scale PLC simulation (`datasim`).
- **Method:** capture the real thing first — field recordings over assumptions — build the regression harness, and measure every change against the same ground truth; written decision records so the next engineer inherits the reasoning.

Experience

IT/OT Solutions Engineer - *Vantage Engineering* (Spruce Grove, AB 2026–present)

Designing the boundary between field equipment and the systems that use its data.

- Built Ignition SCADA CI/CD: pre-deployment testing of Ignition Python scripts against CPython 2.7, Jython and Ignition's own Jython over an offline runtime simulation — deployed scripts run unmodified and unaware; Git-managed deployments.
- Developed a secure DNP3 data diode supplying real-time field data to IT systems while leaving OT field equipment unreachable from the IT side, without relaxing the unidirectional guarantee.

R&D Consultant - *Dominion R&D Corp.* (Remote, 2009–present)

Integration, telemetry and control systems for energy and industrial clients; remote systems that run unattended for years.

- Delivered ruggedized satellite-connected monitoring, communications and video systems across Alberta oilfields; field-serviceable and diagnosable from hundreds of kilometres away.
- Deployed and operate a fleet of hundreds of remotely monitored Starlink-connected routers across remote sites: indoor/outdoor WiFi, camera monitoring, and on-site PCs running AI image analysis (Blue Iris) that triggers event reporting and annotates video segments.
- Built and operate `BUCKy`, a production generative-AI assistant grounding a ~100K-token knowledge base: the base is precomputed once into a KV cache and cloned copy-on-write per session, cutting per-query serving cost ~10x across interchangeable backends — the same shape of problem as turning accumulated operational knowledge into briefings and decision support; runs on commodity laptop hardware, no exotic equipment required.
- Created `cpppo`, the Python EtherNet/IP and CIP library used worldwide as the integration layer between analytics and the PLCs on the plant floor.
- Built `datasim`, a large-scale PLC simulation environment (hundreds of concurrent PLCs) that records and replays real field data and injects latency, loss and bandwidth limits.
- Designed, fabbed and bench-tested a prototype 1-Wire sensor board for intrinsically safe grain-bin monitoring; the pilot did not proceed.
- Authored `LocalWebAuthn` and `crypto-licensing`: self-hosted passkey authentication with no credential store worth stealing, and Ed25519-signed license verification.

Software Engineer - *clearGRID Ltd.* (Kelowna, BC 2017–2022)

Replaced expensive proprietary radio telemetry with commodity SDR hardware, by recovering signals the vendor's receivers discarded as noise.

- Built an end-to-end real-time receiver that polyphase-filterbank-channelized I/Q streams into 200 kHz channels — a 25 Msps collection into 125 channels, the production band into 65 — decoding SCM reports on 64 concurrent 900 MHz ISM-band channels, sustained, with no dropped samples.
- Designed the polyphase filterbank channelizer and window/DFT chain; hand-optimized hot paths in AVX and NEON.

- Estimated sub-sample arrival offsets and per-signal baud rate against a drifting reference clock, with per-channel noise-floor and SNR estimation driving detection thresholds.
- Recovered messages below the noise floor by soft-decision search over the least-confident bits, constrained by learned per-transmitter priors.
- Built a recorded-signal regression harness so algorithm changes were measured against captured field data rather than synthetic benchmarks; integration with flight-approved hardware, power and communications.

Distributed Systems R&D - *Holo Ltd.* (Kelowna, BC 2018–2020)

- Architected and validated HoloFuel's partition-tolerant transaction engine in Rust: agents advance their shared state whenever they can communicate, with no total-order or quorum lockup — the system never waits for a partition to heal.

Sr. IT Advisor - *Enbridge Pipelines* (Edmonton, AB 2002–2009)

Custom RTUs and communications for hydrocarbon pipeline control; the protocol is still in operation.

- Developed solid-state RTU firmware for continuous 24/7 control in remote locations, sustaining fewer than 1 defect per 10,000 lines of code, measured in the field, not the lab.
- Architected LiveWIRE, a cryptographically secure, Reed-Solomon erasure-coded, multi-route protocol for real-time SCADA telemetry over marginal and intermittent links, maintaining integrity across untrusted network segments.
- Deployed hundreds of ruggedized units across critical infrastructure sites.

Software Developer - *Hewlett-Packard* (Calgary, AB 1989–1996)

- Re-engineered the core alarm engine of the RTAP SCADA platform around DFA state machines; still deployed in pipeline SCADA systems continent-wide, 30+ years on.

Open Source

- cpppo - Industrial EtherNet/IP, CIP and Modbus protocol implementation (Python)
- LocalWebAuthn - self-hosted passkey-only authentication (TypeScript)
- ezpwd-reed-solomon - Reed-Solomon and BCH FEC, used by aerospace and defence developers (C++/JS/Python)
- ikona-style - derived gear tooth forms and balanced servo layouts (JS)

Education

B.Sc. Computer Science - *University of Calgary* (Calgary, AB 1984-1989)