LUCAS MOUGEOT

Systems Engineer | Platform, Automation & Applied AI | Hardware-Software Integration

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SUMMARY

Systems engineer with deep grounding in physical systems, algorithms, and production software platforms. Proven ability to design deterministic, auditable systems spanning robotics and automation, materials research, computational geometry, and AI-assisted infrastructure. Known for schema-first design, rigorous validation, and building end-to-end systems that remain correct under real-world constraints.

EXPERIENCE

Integration Engineer — EZ Systems (Full-Time) Feb 2025 – Aug 2025

- Served as an R&D and systems integration engineer at the intersection of AI, robotics, AR/VR, and physical compliance constraints.
- Designed and implemented a real-time ADA compliance auditor combining computer vision, LiDAR-derived measurements, and parsed regulatory rules.
- Architected a unified QA framework orchestrating SOTA AI inference, physical sensor calibration, and ML deployment; specified mechanisms to mitigate model drift, enable online learning, and established CI/CD pipelines for agentic optimization.
- Developed robotic scan-path generation software from customer-provided STEP models, translating geometric requirements into executable motion plans.
- Delivered mixed-reality (AR) and AI-enabled demonstrations bridging internal R&D work into pilot-ready, customer-facing systems.
- Lead engineer for a self-driving lawn mower pilot program operating in solar-field environments.
- Authored technical strategy documents, including a federal grant proposal on explainable AI, internal R&D specifications, and company-wide AI integration guides.

Founding Systems Engineer — Stealth Compliance Platform 2024 – Present

- Architected and implemented a production-grade AI-assisted compliance and decision platform spanning intake, attribution, legal reasoning, and auditability.
- Designed and built a schema-driven form generator powering AI-guided intake, validation, submission, and routing workflows.
- Enforced deterministic logic via schema-first design, isolating probabilistic AI components to ensure auditability.
- Built versioned legal knowledge graphs using PostgreSQL ltree with temporal validity windows, overrides, and cryptographically chained audit logs.
- Implemented hybrid RAG pipelines (vector + full-text) with citation-anchored synthesis and hallucination filtering.
- Developed first-party attribution and identity systems with consent enforcement, deterministic hashing, and dispute-grade evidence reconstruction.
- Deployed multi-service Docker architectures using PostgreSQL (Supabase), Redis, and BullMQ workers with strict API / worker separation.
- Built comprehensive test suites including fuzz testing, concurrency testing, golden-set regression, and end-to-end validation.

Graduate Research Assistant — Materials Science (NASA-Funded Capillary Devices) 2023 – 2024

- Designed and fabricated porous ceramic devices enabling passive capillary transport in microgravity environments for space agriculture.
- Developed 36 ceramic formulations with controlled pore structure; executed iterative experiments to optimize capillary rise, stability, and manufacturability.
- Built MATLAB computer-vision pipelines for pore segmentation, morphology quantification, and statistical ranking of candidate formulations.
- Characterized microstructure and composition using SEM/EDS; documented processing–structure–property relationships.
- Authored SOPs, DOEs, and failure-mode documentation; delivered a top formulation achieving ~3× NASA baseline performance in bench tests.

Undergraduate Researcher — Computational Geometry (NSF-Funded) 2020 – 2022

- Developed and implemented the degree-4 plane geometric spanner in modern C++ using CGAL under strict planarity and stretch-factor constraints.
- Introduced a heuristic-based degree-3 spanner construction extending the degree-4 framework to lower-degree graphs while preserving practical performance.
- Designed a novel approach for connecting spatial point clusters enabling improved locality handling in dense and heterogeneous point sets.
- Developed point categorization and classification algorithms guiding spanner construction decisions based on geometric and neighborhood properties.
- Theorized and explored new application domains for geometric spanners including congressional district mapping to counteract gerrymandering.
- Work contributed to a peer-reviewed ACM Journal of Experimental Algorithmics publication and SoCG media exposition.

SELECTED PROJECTS

Automated Lithium-Ion Battery Pack Assembler Senior Design Capstone

- Designed and implemented an automated lithium-ion battery pack assembly system using an AutomationDirect Do-More PLC.
- Developed ladder logic coordinating motion sequencing, interlocks, fault handling, and safe state transitions.
- Integrated an RP Series robotic dispenser via RS-232 serial communication to initiate external job file execution.
- Implemented PWM-based servo motor control for precise positioning and timing.
- Delivered a deterministic, repeatable automation pipeline with full I/O mapping and bring-up procedures prior to generative AI tools.

EDUCATION

University of North Florida

M.S. Materials Science & Engineering (Thesis-Based) — GPA: 4.00 / 4.00

- Thesis: Development and Characterization of Ceramic Devices for Capillary Action in Microgravity for the Purpose of Growing Vegetables in Space (NASA-Funded)

B.S. Electrical Engineering — GPA: 3.93 / 4.00

B.A. Interdisciplinary Studies: Morphology of Futurism — GPA: 4.00 / 4.00

Concentrations: Mechanical Engineering, Materials Science, Chemistry, Physics, Computing, Mathematics, Mandarin Chinese

PUBLICATIONS & PRESENTATIONS

- Bounded-Degree Plane Geometric Spanners in Practice — ACM Journal of Experimental Algorithmics (Peer-Reviewed)
- Highly Sensitive and Stable pH Sensor Electrodes of TiN Fabricated Using HiPIMS with Kick — AVS 69 Poster, 2023
- Interactive Tool for Bounded-Degree Plane Geometric Spanners — SoCG Media Exposition, 2021

TECHNICAL SKILLS

Languages: Python, C++, TypeScript, JavaScript, SQL, MATLAB, Ladder Logic (PLC), Swift, PowerShell
Software & Infra: Docker, PostgreSQL (Supabase), Redis, BullMQ, GitHub Actions (CI/CD), Vercel, Render
Frontend & Sim: Next.js, React, TailwindCSS, Unity (AR/VR), Playwright (E2E Testing)
AI & Applied Math: OpenAI API, Embeddings, Hybrid RAG, Agents, Computational Geometry, Graph Theory
Hardware & Controls: PLC Automation, RS-232 Serial, PWM Motor Control, Sensors, Robotics Integration
Materials & Simulation: QuantumATK (DFT), Ansys (FEM), DC Sputtering, HiPIMS, SEM/EDS, Thin-Film Fab