

Elfege Arthur Leylavergne

Senior Software Engineer & Educator | AI Solutions, Tech Integration, Curriculum |
Ph.D. Logic & Epistemology

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PROFILE

Senior software engineer whose technical and teaching work have been interwoven for twenty-five years — IT administrator and operator-trainer at Teleperformance during my Bachelor's, the colleague-who-fixes-the-network as an *Assistant d'Éducation*, the in-house tech reference among LFNy philosophy faculty, the school's robotics teacher, and its formal Tech Integrator (2012–2016); then three years at Mindhop shipping production systems for state DOTs (2023 – March 2026), with one concurrent semester of evening adjunct philosophy at Dominican University New York. Now returning to education and non-profit work — the sense of work that answers to other people, not to a balance sheet, is what I have missed. Active open-source work at github.com/elfege in AI agent infrastructure — RAG, episodic memory, LLM tooling — the space non-profit education is now navigating.

WHY THIS BACKGROUND FITS EDUCATION TECH

- **20 years inside secondary education (2002 – 2022) — 18 as Philosophy Professor** across the French public-school system and 15 years at LFNy (faculty + tech integrator + robotics program founder). Working-class, middle-class, and international student bodies.
- **Empowered non-technical staff:** trained teachers on classroom digital tools and designed workflows non-engineers could maintain.
- **Production AI work today:** agent orchestration, RAG pipelines, vector-based episodic memory (*Anamnesis*), Chrome Extension orchestrating LLM calls against ATS forms.
- **Production reliability:** 120+ days continuous uptime on safety-critical NYSDOT edge systems, 7-layer watchdog architecture.

CORE COMPETENCIES

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|--------------------------------------|---|
| AI / LLM Engineering: | RAG pipeline design, agent orchestration, vector search (HNSW, MongoDB Atlas \$vectorSearch, 1024-dim embeddings), prompt engineering, episodic memory architectures, Claude API + CLI integration, Ollama local inference, sentence-transformers, multi-model embedding pipelines |
| Languages: | Python, JavaScript/ES6, TypeScript, C++ (firmware + robotics), SQL, Bash (preferred for infra automation), Groovy |
| Back-End: | FastAPI, Flask, Node.js/Express, PostgreSQL, MongoDB, REST API design, async architectures (asyncio, aiohttp, APScheduler), event-driven systems, Apache Flink & Kafka |
| Front-End: | React 19, Next.js 15, TypeScript, MUI, Tailwind, TanStack React Query, Socket.io, Leaflet/GeoServer, ECharts, Jinja2 |
| Cloud & DevOps: | Docker (Compose, Swarm), AWS (ECR, EC2, S3, Secrets Manager, SSO), GitHub Actions, GitLab CI, Linux administration, systemd |
| Education-Sector Tooling: | FERPA-aligned data handling practices, classroom-grade IoT & robotics curricula, hand-built digital-pedagogy platforms (HTML / JavaScript / CSS, RSS, video) |
| Security & Compliance: | NIST (SP 800-160 / 800-37), PII-aware data flow design, AES-256, JWT/CSRF, TLS, defense-in-depth, audit-trail architectures |
| Pedagogy & Communication: | Audience-adapted instruction across the full age range (university-rigor for the 4-hour baccalauréat philosophy exam; age-appropriate scaffolding for middle-school robotics). Differentiated practice via weekly <i>heures de dialogue</i> , opt-in tutoring, written feedback. Curriculum design, mentoring non-engineers, technical writing, public speaking (TED-Ed, 2014). |
| Languages: | Native English & French; working Portuguese (conferences in Lisbon & Évora); intermediate Spanish; conceptual familiarity with Ancient Greek, Latin, German. |

EXPERIENCE

Senior Software Engineer — Mindhop Inc., White Plains, NY | 2023 – March 2026

AI Infrastructure & Agent Tooling — Engineering Productivity

Built to accelerate my own Mindhop work — coordinating multiple Claude Code instances across the codebase, retaining cross-session context, and offloading repetitive engineering tasks.

- **Anamnesis:** vector-based episodic memory (FastAPI + MongoDB Atlas Local \$vectorSearch, HNSW 1024-dim) shared across 20+ concurrent Claude Code instances over 4 networked machines via SSH ProxyJump chains.
- Same infrastructure powers an open-source job-tracker / Chrome Extension (FastAPI, Claude CLI, RAG, Chrome Debugger Protocol form filling, nightly APScheduler pipeline).

Over Height Vehicle Detection — NYSDOT Production Edge System

- Sole architect of a real-time safety system integrating LiDAR, IP cameras, and automated traffic control. Fault-isolated multi-process architecture (5 processors + Flask app) in a single Docker container with 7-layer watchdog; 120+ days continuous field uptime.
- Dual-sensor correlation: LiDAR + VCA cameras with confidence-plateau detection — 18 duplicate detections reduced to 1 optimal output. MQTT / WebSocket to TMC dashboards; AVRO pipeline via Apache NiFi.
- Automated field installer handles encryption, hardware integration (LiDAR / PTZ / SNMP), systemd — non-technical staff run the install from the runbook.

DMS Control, Device Monitoring & Real-Time Alerts

- Reverse-engineered NTCIP 1203 from MIB specs; built vendor-agnostic driver framework with 31 end-to-end tests — no SDK, no vendor support.
- Network monitoring for UDOT: 16,000+ devices, 750+ subnets, 90%+ cycle-time reduction (54 min to 5 min) via async + adaptive batching.
- Real-time alert routing on Apache Flink + Kafka; PostgreSQL stored procedures, modular SMTP/Twilio dispatch.

Adjunct Professor of Philosophy — Dominican University New York | one semester, concurrent with Mindhop

Faculty, Technology Integrator & Robotics Program Founder — Lycée Français of New York | 2007 – 2022

Philosophy and logic at university-rigor level inside a \$100M+ K-12 non-profit, alongside contributing to the institution's technology modernization and founding its robotics program.

Technology Integrator (formal role: 2012 – 2016)

- Contributed to the institution's broader technology modernization during this period; on multiple metrics LFNY now outcompetes for-profit Manhattan schools several times its budget.
- Trained faculty (mostly non-technical) on classroom integrations and digital-pedagogy tools — translated technical constraints into vocabulary teachers could act on.
- **Year-long one-to-one teacher mentorship.** Followed individual colleagues across the school year — class observation, regular meetings, situated advice on tech-for-pedagogy and tech-for-self-development. Sustained accompaniment, not one-shot workshops.

Robotics Program — Founder & Lead (2015 – 2022, Middle & High School)

- **Deliberately non-competition.** The standard high-school circuit (FIRST, VEX) rewards remote-controlled cars styled as robots; we built genuinely *autonomous* systems. Harder, slower, real learning — program is in its 10th year.
- Founded from scratch: designed curriculum, sourced hardware, taught C++ firmware, sensor integration, and closed-loop control to students with no prior programming. Students shipped working autonomous robots by end of year (PID, encoders, ultrasonic / IR / IMU, custom PCBs).

Faculty & Polysophia Research Collective (2007 – 2022)

Teaching approach. Demanding and accessible at the same time — high methodological rigor anchored in concrete examples drawn from students' everyday lives. The job is to bring abstract ideas within reach of the student in front of you, not to lower the ceiling. I was headhunted directly from public examination of my pedagogy materials and stayed for 15 years. Department head Dr. Isabelle Milkoff (Head of French & Philosophy, LFNY) wrote in 2021 that "one of the most remarkable skills of Mr. Leylavergne is the limpidity and eloquence of his explanations as well as the relevance of the examples he finds in students' everyday life in order to support them in their access to the world of abstract ideas," and described "a very powerful relationship of trust between the students and their professor."

- **Scale and equity practice.** ~100 students per year from A to Z toward the baccalauréat. Held weekly *heures de dialogue* as free supplementary tutoring — three hours of open one-on-one office time. **Refused paid private tutoring on principle:** every student would either be in my class or end up in my class in Terminale, and a fee gate on supplementary work was incompatible with that responsibility.
- **Spring-break revision sessions — founded as unpaid volunteer work.** Started them on my own time off the clock; the institution later formalized the program school-wide.
- **Methodology toolkit, refined across 18 cohorts.** Structural templates for dissertation and *explication de texte*, worked corrigés on official Bac sujets, and a 39-entry *Dictionnaire axiomatique et catégoriel* grounded in my doctoral "axiomatique-critique" method. Summers were research time, feeding the next year's teaching tools.
- **Hand-coded digital pedagogy from 2005 onward** — built a dynamic pedagogical site (HTML / JavaScript / CSS, RSS, video) when most teachers were avoiding the web entirely; this pre-dated and produced the LFNY headhunt, and underpinned the later Tech Integrator role.

- **Polysophia** (2009 – 2022) — co-founded with David Soquet; cross-disciplinary student-led research under professional scientific supervision. Partners: [Prof. Chiappori](#) (Columbia, economics), [Pr. Casanova](#) (Rockefeller, immunology), Dr. Ozon (genomics).
- **Epistemology Club + invited speakers.** Founded an Epistemology Club connecting Philosophy, Mathematics, and Science departments. Speakers included Prof. Chiappori (Columbia) on three visits teaching micro/macroeconomics directly to students; [Étienne Klein](#) on two visits on the foundations of physics; [Alexandre Zabi](#) (CERN / CMS) on quantum mechanics in 2017; and [Derek Muller](#) (Veritasium) in 2015.
- **Manon Garcia visit (Nuit de la Philosophie).** Brought philosopher [Manon Garcia](#) to LFNY; ten of my advanced philosophy students studied her book *On ne naît pas soumise, on le devient* in advance and held a sustained discussion with her.
- **Student-led conferences.** Organized student participation in the French Embassy's Night of Philosophy (Brooklyn Public Library); my LFNY student **Lorenza Wolzka de la Torre** presented her Polysophia article *Hegel's Big Mistake*.
- **TED-Ed bilingual club** (2014) — co-led an LFNY chapter; [covered on the TED blog](#). **Ph.D. thesis published:** *Une Critique Hégélienne de Hegel* (PAF, Paris, 2014; ISBN 978-989-20-3141-5).

Education Assistant → Philosophy Teacher — Ministère de l'Éducation Nationale, France | 2002 – 2007

Started in 2002 as *Assistant d'Éducation* across collège and lycée placements (Alsace and Savoie), then Philosophy Teacher in the lycée system from 2004 — Ministry-employed, public and state-contracted private. Working-class, middle-class, rural and urban classrooms preparing for the same baccalauréat with no institutional safety net. The pedagogy I later codified at LFNY first took shape in those rooms.

Software Engineer (probono) — PowerYou AI, New York, NY | 2022

Probono engagement to help a friend's startup whose codebase was in critical condition after the prior team's abrupt departure. Stabilized React.js and React Native apps, hardened AWS (IAM least-privilege, S3 backups), transitioned ad-hoc config to a documented state. The startup is now operating.

IT Administrator, Trainer & Operations Manager — Teleperformance, Strasbourg, France | 1999 – 2001

Sole IT administrator + operations lead at a regional call-center site during a full infrastructure modernization (Novell → Windows NT, IPX/SPX → TCP/IP with 500% throughput gain, dBASE → MySQL with web reporting). Designed and ran the in-house operator training program — curricula, certifications, client knowledge transfer (Azure Assurances among others). Managed a 20+ person team; 20% productivity / 10% profit gain over the engagement. Worked while finishing my Bachelor's full-time at Université de Strasbourg. This is where my teaching life started, before any classroom.

Open-Source Developer — New York | 2007 – Present

The pedagogy I taught middle- and high-school robotics students I also built and shipped at home — autonomous robots, custom firmware, a 200+ device home infrastructure on code I wrote.

- **Embedded autonomous robotics** (C++ on ESP32 / ATmega2560 / Arduino): closed-loop PID with encoder feedback, 3-DOF arm with inverse kinematics, on-device HTTP servers; on one ATmega2560-based commercial platform, decoded the proprietary UART protocol via logic-analyzer capture and replaced its full firmware stack.
- **200+ device home automation** on custom C++ firmware (ESP32 / ESP8266) with a matching driver layer — every device speaks a protocol I wrote on both ends, surfaced simultaneously to HomeKit, Hubitat, SmartThings, and Alexa. No vendor cloud in the path.
- **Roomba 980 community integration:** built a Node.js bridge on top of the Dorita library and wrote the first community SmartThings driver in Groovy, later ported to Hubitat. Subsequently forked and extended by other developers.
- **MOBIUS.NVR:** 17+ IP cameras across 4 vendors (Python / Flask / Docker), ONVIF / WebRTC / MediaMTX at 200ms latency.
- **Linux homelab** (Proxmox on Dell R730xd): 20+ self-hosted services managed entirely via Bash automation; Ubiquiti network stack, VLAN segmentation across 8 zones.

EDUCATION

Springboard Software Engineering Curriculum (800+ hours), California BPPE — Certification 2023

Ph.D., Université de Nantes — Logic & Epistemology | Summa Cum Laude | Published thesis (ISBN 978-989-20-3141-5)

Master's, Université de Grenoble Alpes & ENS Lyon — Logic, Epistemology, Sciences of Languages & Philosophy | Magna Cum Laude

Bachelor's, Université de Strasbourg — Philosophy | Mention Assez Bien (with merit) | completed while employed full-time at Teleperformance

INTERESTS

Lover of knowledge in the old sense — insatiably curious, several open threads at any time. Currently writing a paper extending my doctoral work on Hegel into the structure of large-language-model self-reference (working title: *Selfhood Without Metaphysical Residue*). Martial arts (Karate, Wing Chun) and swimming. A born teacher: the impulse to take a hard idea apart for someone else is what most of my work is, one register or another.