

# Elfege Arthur Leylavergne

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

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## PROFILE

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Senior software engineer with two decades of secondary-school philosophy teaching across the French public-school system and the Lycée Français de New York, in parallel with a career shipping production systems for state DOTs since 2022. I translate organizational requirements into working software, mentor non-technical stakeholders, and build infrastructure that is documented and maintainable by people who weren't in the room. I have lived experience with how schools actually operate: budget constraints, committee dynamics, FERPA-shaped data handling, students from every kind of background, and the gap between an aspirational JD and the hands-on work of getting something shipped. My current self-directed work centers on AI agent infrastructure (RAG pipelines, episodic memory systems, LLM tooling) — the same problem space non-profit education is now navigating.

## WHY THIS BACKGROUND FITS EDUCATION TECH

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- **20 years inside secondary education (2002 – 2022) — 18 as Philosophy Professor** across the French public-school system and 15 years at Lycée Français de New York (faculty + tech integrator). 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.
- **Founded a robotics program** from zero — designed curriculum, sourced hardware, taught C++ to high schoolers; now in its 10th year.
- **Production AI work today:** agent orchestration, RAG pipelines, vector-based episodic memory (Anamnesis), Chrome Extension that orchestrates 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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<b>AI / LLM Engineering:</b>	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
<b>Languages:</b>	Python, JavaScript/ES6, TypeScript, C++ (firmware + robotics), SQL, Bash (preferred for infra automation), Groovy
<b>Back-End:</b>	FastAPI, Flask, Node.js/Express, PostgreSQL, MongoDB, REST API design, async architectures (asyncio, aiohttp, APScheduler), event-driven systems, Apache Flink & Kafka
<b>Front-End:</b>	React 19, Next.js 15, TypeScript, MUI, Tailwind, TanStack React Query, Socket.io, Leaflet/GeoServer, ECharts, Jinja2
<b>Cloud &amp; DevOps:</b>	Docker (Compose, Swarm), AWS (ECR, EC2, S3, Secrets Manager, SSO), GitHub Actions, GitLab CI, Linux administration, systemd
<b>Education-Sector Tooling:</b>	FERPA-aligned data handling practices, classroom-grade IoT & robotics curricula, hand-built digital-pedagogy platforms (HTML / JavaScript / CSS, RSS, video)
<b>Security &amp; Compliance:</b>	NIST (SP 800-160 / 800-37), PII-aware data flow design, AES-256, JWT/CSRF, TLS, defense-in-depth, audit-trail architectures
<b>Pedagogy &amp; Communication:</b>	Audience-adapted instruction across the full age range — university-level rigor where the French baccalauréat philosophy curriculum demands it (mandatory 4-hour written exam, university-tier content), and age-appropriate scaffolding for middle-school robotics. Differentiated practice via weekly <i>heures de dialogue</i> office hours, opt-in tutoring, written feedback. Curriculum design, mentoring developers and non-engineers, technical writing, public speaking (TED-Ed, 2014). Native English and French. Working Portuguese — gave conferences in Lisbon and Évora; a brief warm-up day or two before sustained conversation. Intermediate Spanish (reading and conversational). Conceptual familiarity with Ancient Greek, Latin, and German — enough to navigate philosophical references.

## EXPERIENCE

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

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#### ***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 a personal 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. Documented for hand-off; non-engineer field staff perform installs from the runbook.

- Fault-isolated multi-process architecture (5 processors + Flask app) in single Docker container with 7-layer watchdog; 120+ days continuous uptime in field deployment.
- Dual-sensor correlation: LiDAR + VCA cameras with confidence-plateau detection — reduced 18 duplicate detections to 1 optimal output. MQTT/WebSocket distribution to TMC dashboards; AVRO pipeline integration via Apache NiFi.
- Automated field installer handles encryption, hardware integration (LiDAR / PTZ / SNMP), systemd config — non-technical staff run the install.

#### ***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: 2,400 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.

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

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Taught philosophy and logic at university-rigor level inside a \$100M+ K-12 non-profit institution while simultaneously driving the institution's technology modernization and founding its robotics program. 15 years inside an education non-profit gave me the operational, political, and pedagogical context that production engineering rarely teaches.

#### ***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 teacher mentorship program.** Followed individual colleagues across the school year — observed their classes, met regularly, brought situated advice on how to integrate technology into their teaching and how to use tech for their own ongoing development. Not a one-shot workshop: a sustained one-to-one accompaniment matched to each teacher's actual practice.

#### ***Robotics Program Director (2015 – 2022) — Middle & High School***

**Pedagogical choice:** deliberately non-competition-oriented. The standard high-school robotics circuit (FIRST, VEX) rewards remote-controlled cars styled as robots; we built genuinely *autonomous* systems — sensors, decisions, closed-loop control. The work is harder, the wins are slower, the learning is real. I refused the easy path and the program is in its 10th year.

- Founded the program from scratch — designed curriculum, sourced and budgeted hardware, recruited middle-school and high-school students.
- Taught C++ firmware development, sensor integration, and closed-loop control to students with no prior programming exposure — same craft, two age groups, two adapted teaching registers.
- Hands-on hardware: motor encoders, PID, ultrasonic / IR / IMU sensors, custom PCBs — students shipped working autonomous robots by end of year.

#### ***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 stakes.** Trained roughly 100 students per year from A to Z toward the baccalauréat — full responsibility for content and methodology, compressed into a single academic year per cohort.

- **Differentiated pedagogy and equity practice.** LFNy is mandated by its statutes to host ~15% scholarship students, and the 450-school AEFÉ worldwide network brings children of diplomatic and expatriate families from African and European countries — many of whom cannot access the kind of private tutoring sometimes presumed for the institution's population. I held weekly *heures de dialogue* — three hours of open one-on-one office time that functioned as free supplementary tutoring for any student who needed it. **Refused paid private tutoring on principle:** every student would either be in my class that year or end up in my class in Terminale (Y12), and a fee gate on supplementary work was incompatible with that responsibility.
- **Spring-break revision sessions — founded as unpaid volunteer work.** I started the first baccalauréat-cohort spring-break revision sessions on my own time, off the clock, simply because students needed the runway. The institution observed it, found it useful, and eventually formalized the program school-wide. The colleagues who took issue with that formalization (because it implied the labor expectation extended to them) is itself a small lesson in how institutional baselines actually move.
- **Methodology toolkit (own work, refined across 18 cohorts).** Started in the French public lycées and continued through the LFNy years — each year tightened the materials I gave to the next: structural templates for the dissertation and explication de texte, year-by-year worked corrigés on official Bac sujets, and a 39-entry *Dictionnaire axiomatique et catégoriel* — a Kantian/Wittgensteinian discipline for constructing rigorous philosophical starting points. The "axiomatique-critique" method (my own term) was born directly out of my doctoral research; the toolkit is what brought it into the classroom. By the later years it was the canonical reference students used during the year and during exams.
- **Summer was research time.** Every summer went into philosophical research and into building the next round of teaching tools — methodology documents, online materials, dictionary entries, prep for the upcoming Polysophia projects and Epistemology Club visits. Teaching during the year and research during the summer fed each other; neither would be what it is without the other.
- **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).

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## 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.

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

Stepped in probono to help a friend's startup whose codebase was in critical condition after the prior development team's abrupt departure. Did this during my own transition from education to for-profit tech, in parallel with Springboard coursework. Stabilized, debugged, and partially refactored both the React.js web app and the React Native mobile app; hardened the AWS environment (IAM least-privilege, S3 backups, EC2 / Route 53 cleanup); transitioned ad-hoc configuration to a documented, maintainable state. The startup is now operating.

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

Sole IT administrator and operations lead at a regional Teleperformance call-center site during a full infrastructure modernization. Two roles in one: rebuilt the technical stack, then trained the people who had to use it. This is where my teaching life actually started — before any classroom.

- **Operator training (formation des opérateurs).** Designed and ran the in-house training program for new and existing call-center operators — wrote the curricula, ran the sessions, built reference documentation, certified staff on each client's systems before they took live calls. Training was as much of the job as administration.
- **Client knowledge transfer.** Bridge between Teleperformance and client companies whose accounts we handled (Azure Assurances among others) — translating their internal processes and product catalogs into operator-facing scripts, decision trees, and training material. Same translator role I have played in every job since.

- Migrated server infrastructure from Novell NetWare to Windows NT with LDAP / IIS; rebuilt directory services, file shares, and print queues with no downtime visible to operators.
- Upgraded the network from IPX/SPX to TCP/IP — 500% throughput increase; redesigned switching, routing, and segmentation.
- Migrated data systems from dBASE / flat files to MySQL with web-based reporting — first time the operations floor could pull its own real-time numbers without going through IT.
- Managed a 20+ person team (operators + supervisors): hiring, scheduling, performance feedback, weekly review cycles. 20% productivity, 10% profit increase over the engagement.
- Worked while finishing my Bachelor's at Université de Strasbourg — full-time job + full-time degree, on top of running training programs at the office.

## Open-Source Developer — New York | 2007 – Present

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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; reverse-engineered a commercial robot's 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**: reverse-engineered the undocumented WiFi protocol (Node.js); first community SmartThings / Hubitat integration, 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

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**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

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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.