

Karim GHALLAB (PhD)

Freelance software engineer (available for new projects).

Full-stack development, AI/LLM integration, and technical training.

✉ Ghallab.Karim@gmail.com

🌐 karim-ghallab.dev

in karim-ghallab

🎧 [Karim Ghallab](#)

🐙 [KarimGhallab](#)

Professional Summary

Freelance Software Engineer and PhD in Computer Science with 5+ years of industrial R&D experience, specializing in software engineering and AI/LLM integration. Experienced in turning prototypes and R&D tools into production-ready systems, with expertise in Node.js, React, Python, RAG, and local inference. 180+ hours of teaching at Sorbonne University.

Technical Expertise

Web	<i>React, Node.js, Angular, TypeScript, Bootstrap, Materialize.</i>
Mobile	<i>React Native</i> (with and without <i>Expo</i>), Native Android and iOS.
Local AI & RAG	End-to-end RAG pipeline, <i>Ollama</i> , <i>KoboldCpp</i> .
languages	<i>JavaScript/TypeScript, Python, Java, Kotlin, C#, Swift, C, PHP.</i>
S. Engineering	Test-driven development (<i>JUnit</i> , <i>Vitest</i> , <i>Playwright</i> , etc.), UML modeling, design patterns.
Database	<i>PostgreSQL, MySQL, SQLite, MongoDB, LanceDB.</i>
Serverless	App deployment on <i>Firebase</i> and <i>Supabase</i> (Hosting, Auth, Storage, Functions).
CI/CD	Build, test and deployment automation with <i>GitHub Actions</i> and <i>Azure DevOps</i> .
Deployment	Containerization with <i>Docker</i> and <i>Podman</i> (Compose); reverse proxies: <i>Caddy</i> , <i>Traefik</i> , <i>NGINX</i> .

Professional Experience

Mar 2020 – Jan 2026 **Research Engineer, CIFRE PhD Student – RedFabriQ & LIP6, Sorbonne University (Paris).**

Industrial R&D on software modernization and variability management.

- Designed and shipped R&D tools to production, from prototype to release; integrated the product development team.
- Designed an automatic migration approach for `#ifdef`-annotated applications, evaluated on five large open-source projects including Chromium ($\approx 1.2\text{M LOC}$).
- Built a feature-oriented code quality analysis on top of *SonarQube* and *Snyk*, with feature-level metrics and fix-prioritisation strategies
- Developed RAG tooling extending LLM context with feature-oriented data; Boolean property analysis with the *Z3* solver.
- Demonstrated the tools to industrial partners and clients; published four peer-reviewed papers.

Selected Projects

2025 (ongoing) **AI-based strategic assistance tool (*Yu-Gi-Oh!* case study).**

End-to-end RAG pipeline with *LanceDB*, served locally via *Ollama*; web app in *React* and *Node*.

- Ingestion, chunking, embedding and semantic retrieval over the card corpus with *LanceDB*.
- Local inference via *Ollama*.
- Web application made with *React* and *Node*; tests with *Vitest* and *Playwright*.

- 2026 (ongoing) **Self-hosted application platform (VPS).**
Pangolin access stack (*Traefik*, *Gerbil*, *Newt*), *WireGuard*-only exposure; *Podman* Compose under *systemd*.
- Zero-trust-style access: *WireGuard*-only entry via *Newt* tunnels, reverse proxied through *Traefik* and *Gerbil*, with SSO accounts and per-app access policies for family members.
 - Services defined with *Podman* Compose and run under *systemd*.

Teaching Experience ($\approx 180\text{h}$)

- 2022 – 2025 **Teaching Assistant for 1st year Bachelor students (tutorials and labs), C Programming – Sorbonne University (Paris).**
- Tutorials and labs on Linux with manual compilation via GCC, from syntax to pointers and memory management; design and marking of assessed labs and exams.
 - Total load: ≈ 115 hours, groups of ≈ 30 students.
- 2022 – 2024 **Teaching Assistant for 2nd year Bachelor students (tutorials and labs), Object-Oriented Programming – Sorbonne University (Paris).**
- Tutorials and labs on OOP principles; supervision of a 6 to 8 week programming project assessed via presentation and report; exam marking.
 - Total load: ≈ 56 hours, groups of ≈ 30 students.
- 2022 – 2024 **Lecturer for 2nd year Master's students (lectures, tutorials and labs), Introduction to Application Migration towards Software Product Lines – Sorbonne University (Paris).**
- Designed and delivered a lecture followed by an applied lab on a case study, jointly with the course coordinator; project supervision and assessment.
 - Total load: ≈ 12 hours, groups of ≈ 20 students.

Education

- 2021 – 2025 **CIFRE PhD in Computer Science – LIP6, Sorbonne University (Paris).**
Thesis topic: *A Hybrid Approach for Managing Software Variability in the Context of Enterprise Application Development*.
Thesis supervisor: Prof. Tewfik ZIADI
Host company: RedFabriQ (Paris)
- 2018 – 2020 **Master's Degree in Computer Science, specialization in Distributed Systems and Applications, with Honors – Sorbonne University (Paris).**
- 2017 – 2018 **Bachelor's in Computer Science, with honours – Sorbonne University (Paris).**
- 2015 – 2017 **University Diploma of Technology in Computer Science – IUT de Vélizy**

Selected Publications

- 2025 Tewfik Ziadi, Karim Ghallab, and Zaak Chalal. An Extensible, Feature-Based Framework for Fine-Grained Code Quality Assessment. In *IST*, volume 189.
- 2025 Tewfik Ziadi, Karim Ghallab, and Zaak Chalal. Automated Recovery of Software Product Lines from Legacy Configurable Codebases. In *41st International Conference on Software Maintenance and Evolution (ICSME)*, pages 656–666.
- 2023 Karim Ghallab, Tewfik Ziadi, and Zaak Chalal. Migrating Individual Applications into Software Product Lines Using the Mobioos Forge Platform. In *30th Asia-Pacific Software Engineering Conference (APSEC)*, pages 483–492.

Languages & Soft skills

- Languages French: Native language – English: C1.
- Soft skills Client and stakeholder communication, pedagogy, ownership and autonomy.