Houssam HAJJ HASSAN

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Paris, France

AI-DRIVEN & AUTONOMOUS SYSTEMS ENGINEER

AI Engineer with 5+ years building and deploying AI-driven systems at the intersection of research and production. Experienced in designing LLM-powered agents, hybrid AI architectures, and end-to-end ML pipelines deployed across Cloud and Edge environments using Python, Docker, and REST APIs. Track record of prototyping novel AI solutions and transitioning them into robust, deployable systems, including award-winning artifacts recognized at IEEE and ACM venues. Collaborative by nature, with hands-on experience working alongside industrial partners (Ericsson, Siemens) to deliver AI capabilities into real engineering workflows.

EXPERIENCE

- **R&D Engineer** — November 2025 –
  Orange Innovation — Châtillon, France
  - Architecting an LLM-powered agentic scene analyzer for robotic swarms, integrating RAG pipelines and MCP-style tool use to enable real-time collaborative environment perception and object detection.
  - Developing adaptive data fusion techniques combining LLMs and ML models to maximize perception precision across heterogeneous robotic swarm sensors.
  - Designing LLM-assisted agentic optimization workflows for 6G industrial IoT communication, translating perception outputs into real-time network decisions via tool-integrated AI agents.
  - Leading research for the CANCUN ANR project, enabling efficient and sustainable IIoT communication (in collaboration with National Taiwan University).

- **Postdoctoral Researcher** — January 2025 – October 2025
  Télécom SudParis — Évry, France
  - Technical lead and main contributor for the PANDORA EU project (with Ericsson, Siemens) for autonomous AIoT operation.
  - Built a causal-GAN synthetic data generation pipeline producing trustworthy, realistic IoT datasets to improve ML model robustness in data-scarce industrial environments.
  - Developed an autonomous MLOps framework for adaptive ML model distribution and lifecycle management across heterogeneous Edge-Cloud infrastructures.
  - Mentored PhD and MSc researchers in autonomous system design and experimental methodology.

- **PhD Researcher** — November 2021 – December 2024
  Télécom SudParis — Évry, France
  - Developed CRAFTER: a Python/PyTorch causal reinforcement learning system for self-adaptive IoT, reducing response latency by 25% - deployed across a 5-node containerized testbed simulating 100 IoT devices.
  - Developed PlanEMQX: an AI planning-enabled MQTT broker for adaptive, priority-aware data flow management, cutting latency by 20% for time-critical flows - **Distinguished Artifact Award**, IEEE ICSA 2024.
  - Developed SPARQ: a QoS-aware cyber-risk mitigation framework combining attack graph analysis and PDDL planning, reducing security exposure by 35% - **Best Paper Award**, ACM/IEEE SEAMS 2025.
  - Designed hybrid AI architecture integrating causal inference, RL, and symbolic planning into a unified self-adaptation middleware - published across 3 A-ranked CORE venues.
  - Mentored MSc researchers in autonomous systems and experimental research.

- **Research Intern** — April 2021 – October 2021
  Télécom SudParis — Évry, France
  - Developed a Java-based simulation tool for performance evaluation of IoT data exchange.
  - Optimized IoT data flow performance using AI planning methodologies.

- ***Telecommunications Engineering Intern*** — May 2019 – July 2019
  Dar Al-Handasah (Shair & partners) — Beirut, Lebanon
  - Conducted network analysis and optimization for telecom infrastructures.

EDUCATION

- **Institut Polytechnique de Paris (IP Paris)** 2021 – 2024
  Ph.D. in Computer Science **(with honors)** Paris, France
  ◦ Thesis: Enabling Autonomous IoT Systems: A Middleware-based Hybrid AI Approach to Self-adaptation
- **Lebanese University** 2020 – 2021
  M.S. in Information Systems and Data Intelligence **(ranked first)** Beirut, Lebanon
- **American University of Beirut (AUB)** 2016 – 2020
  B.E. in Computer and Communications Engineering **(with distinction)** Beirut, Lebanon

TECHNICAL SKILLS

- **Programming:** Python, Java
- **AI / ML:** Scikit-learn, PyTorch, LLM fine-tuning & deployment, Agentic AI, RAG, LangChain, MCP
- **MLOps & Infra:** Docker, Kubernetes, CI/CD, REST APIs, Edge-Cloud deployment
- **Cloud:** AWS

SELECTED SCIENTIFIC PUBLICATIONS

[1] **H. Hajj Hassan**, A. Kattepur, D. Conan, G. Bouloukakis. "CRAFTER: Causality-based Self-Adaptation for Autonomous IoT Systems". *The 21st International Conference on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2026, ranked A in CORE).*

[2] C. Badolato, N. Samson, **H. Hajj Hassan**, C. Huang, G. Bouloukakis, P. Pappachan, R. Yus. "PSMark: A Distributed IoT Benchmark for Publish/Subscribe Under Domain-Based Workloads". *The 24th International Conference on Pervasive Computing and Communications (PerCom 2026, ranked A* in CORE).*

[3] A. Palma, **H. Hajj Hassan**, G. Bouloukakis. "SPARQ: A QoS-Aware Framework for Mitigating Cyber Risk in Self-Protecting IoT System". *The 20th International Conference on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2025, ranked A in CORE).* **Best Paper Award.**

[4] K. Maruvada, **H. Hajj Hassan**, A. Kattepur, G. Bouloukakis. Adaptive Model Selection using Meta Models and Drift Adaptation. *Workshop on systems for the Future of AI/ML (SysAI) @ The 18th International Conference on COMmunication Systems & NETworkS (COMSNETS 2026).*

[5] **H. Hajj Hassan**, G. Bouloukakis, L. Scalzotto, N. Khaled, D. Conan, A. Kattepur, D. Belaïd. "A Message Broker Architecture for Adaptive Data Exchange in the IoT". *The 21th International Conference on Software Architecture (ICSA 2024, ranked A in CORE).* **Distinguished Artifact Award.**

Full list available on Google Scholar.

LANGUAGES

French (fluent), English (fluent), Arabic (Fluent)

REFERENCES

References are available on request.