Omar AbedelKader

CV

Last updated: January 2026

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About Me

I am an AI researcher with extensive experience in artificial intelligence and software engineering.
I am currently pursuing a Ph.D. in Computer Science at the University of Lille.

Core Expertise

- Knowledge Bases & Knowledge Engineering
- Software Engineering & Large Language Models (LLMs)
- Information Systems & Knowledge Management
- Research Coordination & Project Leadership
- Team Management & Mentorship
- Applied AI for Public and Institutional Use

Responsabilities

- Leader of the project **ChatPharo**, **Pharo-Copilot** and **PharoGPT**
- Mentor for **Google Summer of Code (GSoC)** 2025
- President of **NeuroTech-Lille**, a student association focused on AI and neuroscience
- Contributor at **Ministère de la Transition Écologique** in *Club IA et Transition écologique*
- Contributor at **Conseil National du Numérique (CNNum)** in *Café IA*
- Supervised numerous software and AI projects at both Licence and Master levels, including research-oriented and applied industry projects

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Education

University of Lille — Villeneuve-d'Ascq, France.
Ph.D. in Computer Science.
(Oct. 2024 – Present)

University of Lorraine — Nancy, France.

M.Sc. in Natural Language Processing.
(Sept. 2022 – Sept. 2024)

Lebanese University — Beirut, Lebanon.
B.Sc. in Data Science.
(Sept. 2019 – July 2022)

Experience

AI Researcher — INRIA (Villeneuve d'Ascq, France)
Oct. 2024 – Oct. 2027
- Improving code completion and generation using LLMs, specifically targeting the Pharo programming language, which has limited training data. - Developing techniques for code completion, type inference, and deployment in Pharo's IDE, with a focus on runtime performance.

AI Engineer — INERIS (Ver.-en-Halatte, France)
Sept. 2023 – Sept. 2024.
- Developing "INERIS-IA," a tool to classify textual documents based on INERIS's strategic goals using ML and NLP techniques. - Creating boolean queries for document retrieval, and improving corpus quality through document similarity and keyword extraction.

Intern — AI Researcher — LIPN (Villetaneuse, France)
June 2023 – Aug. 2023
- Comparison of various sampling techniques for probabilistic planning, particularly in generating literary narratives. - Evaluated different methods, including the Score Function Estimator (SFE) and more advanced techniques like Gumbel-Softmax, to assess their effectiveness in creating coherent and creative stories.

Software Developer — BEON-IT (Beirut, Lebanon)
May 2022 — June 2022 - JAVA· Design Patterns· .NET Framework· Threading· Microsoft SQL Server

Full Stack Developer — SSCC-IT (Andket, Lebanon)
November 2020 - April 2021 - PHP & SQL· Design Patterns· Microsoft SQL Server

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Software

PharoGPT

- LLM-based code assistant for the Pharo ecosystem, inspired by ChatGPT but specialized for Smalltalk/Pharo.
- Fine-tuned language models on Pharo codebases to overcome data scarcity and language-specific challenges.
- Designed end-to-end pipeline including data collection, model fine-tuning, evaluation, and deployment.
- Integrated directly into the Pharo IDE for interactive code generation and assistance.
- **GitHub Repository:** PharoGPT (https://github.com/omarabedelkader/PharoGPT)

Pharo-Copilot

- Intelligent code completion and generation tool for Pharo, inspired by GitHub Copilot.
- Focused on repository-level and package-aware code completion.
- Leveraged LLMs to improve developer productivity in a dynamically typed language.
- Used by more than 100 users within the Pharo community.
- **GitHub Repository:** Pharo-Copilot

ChatPharo

- Live conversational interface between Pharo developers and Large Language Models.
- Enables interactive discussions with LLMs directly from the Pharo environment.
- Designed an open and extensible architecture to experiment with multiple LLM backends.
- Project leader with a team of more than 5 contributors.

- **GitHub Repository:** ChatPharo

INERIS-IA

- AI platform developed at INERIS for document classification and knowledge management.
- Built a Flask-based web interface integrating multiple ML and NLP models.
- Trained document classification models aligned with COP 2027 objectives and INERIS strategic themes.
- Implemented additional features including document similarity, keyword extraction, and corpus quality improvement.
- **GitHub Repository:** INERIS-IA

Family Dynamics Analysis

- This project analyzes family dynamics in France using Formal Concept Analysis (FCA).
- Leveraging data from the French national census, the study identifies patterns in family structures, single-parent households, childbearing decisions, and naturalization through marriage across five regional zones.
- Using advanced data mining techniques, the project explores relationships between demographic variables such as marital status, household composition, and nationality, offering insights into the cultural and social trends shaping French households.
- **GitHub Repository:** Family Dynamics Analysis
- **Paper:** https://github.com/omarabedelkader/FCA/blob/main/paper/paper.pdf

Real-Fake Face detection

- This project demonstrates the process of building and training a neural network for classification tasks using machine learning frameworks.
- Walks through data preprocessing, model architecture definition, training, evaluation, and visualization of results, providing insights into model performance and prediction accuracy.

- **GitHub Repository:** https://github.com/omarabedelkader/real-fake-detection

EESMACF

- This project focuses on evaluating the effectiveness of two NLP models—SBERT (Sentence-BERT) and MiniLM—in classifying analogies using the FrameNet dataset. FrameNet is a rich semantic database that captures the meanings of lexical units within specific contexts called frames.
- The objective is to identify valid and invalid analogies in FrameNet, leveraging the capabilities of SBERT and a fine-tuned MiniLM model. SBERT is used to create dense vector embeddings of sentences that retain semantic similarity, while MiniLM is trained and fine-tuned to classify analogies effectively.
- The project found that MiniLM achieved an impressive 99% accuracy in distinguishing between valid and invalid analogies, outperforming SBERT, which had around 55% accuracy.

- **GitHub Repository:** https://github.com/omarabedelkader/EESMACF

- **Paper:** https://github.com/omarabedelkader/EESMACF/blob/main/paper/paper.pdf

DeGatto

- The "DeGatto" project is a sentiment analysis framework designed for e-commerce, specifically focusing on women's apparel reviews. Using a dataset sourced from Kaggle, which includes over 23,000 sentences and aspect-level annotations for material, size, design, and comfort, the project aims to support e-commerce businesses and customers by analyzing feedback at both the sentence and aspect levels. Various NLP, DL, and ML models were tested, including LSTM (BiLSTM), SVM, Logistic Regression, and Multinomial Naive Bayes, with BiLSTM achieving the best results in sentence-level analysis and LinearSVC performing well at aspect-level analysis. A visualization tool was developed using ReactJS and NodeJS, enabling users to view results as bar or pie charts. The

project concluded that BiLSTM is the most suitable model for sentence-level sentiment analysis, while LinearSVC excels in aspect-level analysis, providing a robust framework for sentiment classification in e-commerce contexts.

- **GitHub Repository:** https://github.com/omarabedelkader/DeGatto
- **Paper:** https://github.com/omarabedelkader/DeGatto/blob/main/paper/DeGatto.pdf

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Publications

AbedelKader, O., Ducasse, S., Zaitsev, O., Robbes, R., & Polito, G. (2025, July). Package-Aware Approach for Repository-Level Code Completion in Pharo. *IWST 2025: International Workshop on Smalltalk Technologies*.

Teaching

- Teaching assistant at IUT: Introduction to Software Development
  - Co-taught split-group sessions alongside the professor, providing hands-on support to students
  - Graded and corrected examination papers
  - Contributed to the design and preparation of exams
  - Supervised student software development projects
  - Served as a member of project defense juries, evaluating student work and presentations

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Talks

ChatPharo: An Open Architecture for Understanding How to Talk Live to LLMs — ESUG 2025
- **Slides:** https://archive.esug.org/ESUG2025/day4/407-abed-chatpharo.pdf - **Video:** *Coming soon*

Awards and Honors

Best Paper Award (3rd place) — IWST 2025, Gdańsk, Poland *"Package-Aware Approach for Repository-Level Code Completion in Pharo"*

Mentorship

- **Google Summer of Code (GSoC)** — Mentor
  - Project: https://gsoc.pharo.org/LLMInterface
- **Demain** — Mentor
  - Link: https://www.dema1n.org

Library

- **Neural Networks Library (Pharo):** Author and maintainer of a native neural network library for the Pharo programming language
  - Designed and implemented core components enabling the creation, training, and evaluation of neural networks directly in Pharo
  - Provides abstractions for layers, activation functions, and training pipelines within the Smalltalk ecosystem
  - Actively maintained and used as a foundation for research and educational projects

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Technologies & Skills

Programming Languages: Python, Pharo, Java, R, JavaScript, PHP, MySQL.
Machine Learning & Deep Learning: TensorFlow, PyTorch, Keras, Scikit-learn.
Natural Language Processing (NLP): SpaCy, NLTK.
Big Data & Distributed Systems: Apache Spark, Hadoop.

Data Analysis & Visualization: Pandas, Matplotlib, Seaborn.
Scientific Computing: NumPy, SciPy.
Web Development: Flask, Django, Laravel, ReactJS.
Databases & Cloud: MongoDB, MySQL, AWS.
Operating Systems: macOS, UNIX, Windows.
Research Areas: Artificial Intelligence, Software Engineering.

Visibility & Testimonials

Alumni Testimonial — IDMC, University of Lorraine: Featured on the official website of the IDMC Institute as an alumni in Natural Language Processing and Artificial Intelligence, sharing academic and professional journey from MSc to PhD. - https://idmc.univ-lorraine.fr/temoignage-alumni-master-tal-omar/

Volunteering

NeuroTech-Lille — President

- Led the executive board and coordinated association activities and projects.
- Managed the annual budget, including financial planning, expense tracking, and funding allocation.
- Represented the association in meetings with university administration, partners, and sponsors.
- Oversaw event planning, workshops, and conferences related to neurotechnology.
- Supervised team members and ensured effective collaboration across departments.
- Defined strategic goals and ensured alignment with the association's mission.

Ministère de la Transition Écologique — Contributor (Club IA et Transition écologique)

- Contributed to ongoing AI-driven projects supporting ecological transition initiatives within the French government.
- Assisted in the development and evaluation of AI use cases for public policy and environmental impact.
- Collaborated with interdisciplinary teams including policymakers, researchers, and technical experts.
- Participated in strategic discussions on responsible and sustainable AI deployment in the public sector.

Conseil National du Numérique (CNNum) — Contributor (Café IA)

- Contributed to national discussions on artificial intelligence, digital policy, and societal impact.
- Assisted in the preparation and facilitation of Café IA sessions bringing together experts, researchers, and public stakeholders.
- Participated in the analysis of AI trends, use cases, and regulatory challenges.
- Supported knowledge-sharing initiatives on responsible and ethical AI.

Croix-Rouge Française — Volunteer First Aider (2022–2023)

- Provided first aid and emergency assistance during public events and operations.
- Responded to medical emergencies following established safety and emergency protocols.
- Collaborated with multidisciplinary teams under high-pressure situations.
- Maintained readiness through regular training in first aid and emergency response.

Hobbies

- **Water Activities:** Swimming · Diving
- **Outdoor and Adventure Sports:** Hiking · Skiing · Skydiving
- **Creative and Artistic Activities:** Photography
- **Precision Sports:** Boxing · Bowling · Golf

Language

- **Arabic:** Native
- **French:** Native
- **English:** B2