Rayane AMMAR KHODJA

PhD Student in Computer Engineering

(+33) 758996612 rayane.ammar-khodja@ifpen.fr LinkedIn GitHub
0009-0006-9597-6656 IdHAL: rayane-ammar-khodja ResearchGate
Lyon, France

RESEARCH PROFILE

PhD student (CIFRE) in Computer Engineering (CNU Section 61) between **IFP Energies Nouvelles (IFPEN)** and **CRAN – CNRS, Université de Lorraine**, working on AI-based fault detection and diagnosis (FDD) in industrial chemical pilot plants. Research areas: Machine Learning (LSTM, GNN, Transformers,LLM), Computer Vision, anomaly detection, and time series analysis for process monitoring and preventive maintenance. Seeking a teaching assistant position to contribute to education in computer science, automatic control, machine learning, and signal processing.

EDUCATION

PhD in Computer Engineering, Automatic Control & Signal/Image Processing *Oct. 2024 – Present*
Université de Lorraine – CRAN (CNRS), Nancy, France | CIFRE with IFPEN

Master's Degree in Mechatronics, Machine Vision and Artificial Intelligence *Sept. 2023 – June 2024*
Université Paris-Saclay, France

Master's Mobility – Smart Aerospace and Autonomous Systems *Feb. 2023 – June 2023*
Politechnika Poznańska (Poznań University of Technology), Poland

Master's First Year – International Track in Electrical Engineering *Sept. 2022 – June 2023*
Université Paris-Saclay, France

Bachelor's in Electrical and Electronic Engineering *Sept. 2019 – June 2022*
IGEE (ex-INELEC), Boumerdes, Algeria

PROFESSIONAL EXPERIENCE

Research Engineer – CIFRE PhD Contract *Oct. 2024 – Present*
IFP Energies Nouvelles (IFPEN), Solaize, France

R&D Intern – Predictive Maintenance *Feb. 2024 – Sept. 2024*
IFP Energies Nouvelles (IFPEN), Solaize, France

Research Laboratory Student *Sept. 2022 – June 2024*
Laboratoire IBISC, Université Paris-Saclay, Ile-de-France, France

PUBLICATIONS

- **R. Ammar Khodja**, A. Voisin, V. Costa, B. Celse, F. Casteran, B. Iung. "Comparative Performance of Machine Learning Architectures for Fault Detection and Diagnosis in Chemical Processes." *13th IMA International Conference on Modelling in Industrial Maintenance and Reliability (MIMAR 2025)*, Vandœuvre-lès-Nancy, France, Jul. 2025. DOI: 10.19124/ima.2025.01.54 – hal-05401011
- **R. Ammar Khodja**, A. Voisin, V. Costa, F. Casteran, B. Celse, B. Iung. "Évaluation des architectures d'apprentissage automatique pour la détection et le diagnostic des anomalies dans les procédés chimiques." *3ème Congrès Annuel de la SAGIP*, Mulhouse, France, May 2025. hal-05471853

RESEARCH & ACADEMIC PROJECTS

Benchmarking ML Methods on the Tennessee Eastman Process (TEP) – FDD study (PCA, LSTM, CNN, Autoencoders, Ensemble Learning)
Graph Neural Networks (ChebNet/GCN) for Spatiotemporal Anomaly Detection in Chemical Processes
LSTM Autoencoder for Multivariate Time Series Monitoring and Fault Isolation
Computer Vision: Human Pose Estimation and Real-Time Action Recognition *PyTorch*
Single-View 3D Object Reconstruction from 2D RGB Images *PyTorch*
Generative Adversarial Network (GAN) for Realistic Image Synthesis *PyTorch*

3D Scene Generation with WebXR and Meta Oculus Quest with Hand Interaction *JS / WebXR*
Breast Cancer Prediction from Mammogram Images *scikit-learn*
Autonomous Robot Data Analysis via Computational Optimization *MATLAB / ROS*
FPGA-Controlled Robotic Arm *VHDL*
Smart Stick for Visually Impaired People with GPS & GSM *Arduino*

TECHNICAL SKILLS

Programming	Python (PyTorch, TensorFlow, Keras, scikit-learn, NumPy, pandas, PyG, DGL, py3Dmol), LangGraph MATLAB/Simulink, C/C++, SQL, VHDL, DSPy, LangGraph, PydanticAI, LlamaIndex
AI / ML	Deep Learning, LSTM, CNN, Transformers, Autoencoders, GNN, LLM, Anomaly Detection, Time Series, PCA/MSPC
Tools	ROS, WebXR, Arduino, FPGA, Linux, LaTeX, Git, VS Code, Anaconda, Docker, SSH
Languages	French (C2), English (C2), Arabic (C2), Kabyle (native)

ACADEMIC SERVICE & CERTIFICATIONS

- **Peer Reviewer** – *Engineering Applications of Artificial Intelligence* (EAAI, Elsevier)
- Energy Economics – IFP Training
- Visual Perception and the Brain – Duke University (Coursera)
- MOOC Project Management Series: Strategic Analysis in Projects; From Project to Entrepreneurial Action; Project Management; Agile Project Management with Scrum; Project Team Management; Creativity Management and Brainstorming; Problem-Solving Tools and Methodology