

# Ahmed Nour Abdesselam

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## RESEARCH INTERESTS

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Recommender Systems, Decision Support Systems, Reinforcement Learning, Explainable AI, Bayesian Networks, Operations Research.

## EDUCATION

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**Free University of Bozen-Bolzano**, Bolzano, ITALY November 2024 — (Expected) 2027  
Doctor of Philosophy in Computer Science  
Tentative thesis title: Recommender Systems for Human-Machine Collaboration in Manufacturing

**University of Belhadj Bouchaib**, Ain Temouchent, ALGERIA September 2022 — June 2024  
Master of Science in Networks And Data Engineering  
Master Thesis: Enhancing Variable Neighborhood Search (VNS) Performance using Reinforcement Learning (RL) for Relay Node Deployment in Wireless Sensor Networks

**University of Belhadj Bouchaib**, Ain Temouchent, ALGERIA September 2019 — June 2022  
Bachelor of Science in Computer Science and Mathematics

**Visoka tehnička škola strukovnih studija**, Subotica, SERBIA February 2024 — June 2024  
Erasmus+ Mobility Exchange Program.  
Scholarship recipient.

## ACADEMIC EXPERIENCE

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**Free University of Bozen-Bolzano** Bolzano, Italy  
*Industrial Ph.D. Student* November 2024 — October 2027

- Supervised by Prof. Markus Zanker and Prof. Angelika Peer, in collaboration with GKN Powder Metallurgy.
- Research focuses on intelligent recommender systems for human-machine collaboration in manufacturing settings.
- Exploring Process-Aware Bayesian Networks to learn and represent operational knowledge from historical decision logs.
- Investigating Reinforcement Learning from Human Feedback (RLHF) to enable dynamic, adaptive recommendations aligned with operator preferences and real-time process states.

**Visoka tehnička škola strukovnih studija** Belgrade, SERBIA  
*Research Assistant* April 2024 — Present

- Supervisor: Dr. Piroška Stanic Molcer
- Conducted applied research on IoT system data, with a focus on time series analysis and automated feature extraction techniques to enhance anomaly detection and system reliability.
- Designed and implemented deep learning pipelines for detecting hardware Trojans in System-on-Chip (SoC) architectures through side-channel analysis, leveraging convolutional and feedforward neural networks to enhance the security of embedded IoT devices.
- Contributed to the development and evaluation of machine learning models in the context of IoT monitoring, with occasional collaboration across institutions.
- The project was supported by the NATO Science for Peace and Security (SPS) Programme.

**CentraleSupélec** Paris, France  
*Research Assistant* June 2023 — September 2023

- Supervisors: Prof. Jalel Ben Othman and Dr. Ali Benzerbadj.
- Project funded by Zayed University and ASPIRE UAE.
- Designed and implemented an intelligent context-aware recommender system for urban mobility.
- Utilized Multi Criteria Decision Making Algorithms: Fuzzy-AHP (Fuzzy Analytical Hierarchy Process) and SAW (Simple Additive Weighting).
- Developed a smart urban mobility application for Android/iOS using Flutter.
- Presented results to the team's global head and wrote an article detailing the value proposition and strategy of presenting the benefits to the end users.
- Repository link: <https://github.com/abdesselam-arch/map.git>

## PROJECTS

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### Master's Thesis

Graduate Researcher

Subotica, SERBIA  
December 2023 — June 2024

- Supervisors: Dr. Ali BENZERBADJ and Dr. Piroška Stanic Molcer.
- Thesis title: Enhancing Variable Neighborhood Search (VNS) Performance using Reinforcement Learning (RL) for Relay Node Deployment in Wireless Sensor Networks.
- Proposed a novel framework for modeling neighborhood selection in VNS metaheuristics as a sequential decision-making problem, integrating reinforcement learning principles for adaptive search strategies.
- Applied the Upper Confidence Bound (UCB) strategy within the General Variable Neighborhood Search (GVNS) framework, modeling the neighborhood selection process as a contextual bandit problem.
- Designed an RL-guided search mechanism that dynamically balances exploration and exploitation to improve metaheuristic performance across different problem domains.
- Validated the approach using wireless sensor network (WSN) relay node deployment as a proof-of-concept, achieving a 40% average fitness improvement compared to traditional VNS strategies.
- Demonstrated significant gains in network coverage and connectivity, while reducing the total number of relay nodes required.
- Project Repository: <https://github.com/abdesselam-arch/RL-based-GVNS.git>.

## PUBLICATIONS

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- Molcer, P.S., Abdesselam, A.N. (2025). Side-Channel Analysis for Hardware Trojan Detection: A Deep Learning Approach. In: Kovács, T.A., Fürstner, I. (eds) Critical Infrastructure Protection: Advanced Technologies for Crisis Prevention and Response. NATO ATC 2024. NATO Science for Peace and Security Series C: Environmental Security. Springer, Dordrecht. [https://doi.org/10.1007/978-94-024-2308-2\\_15](https://doi.org/10.1007/978-94-024-2308-2_15)

## TECHNICAL SKILLS

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- **Programming Languages:** Python, Matlab.
- **Data visualization:** Tableau, Microsoft Power BI.
- **Machine Learning:** TensorFlow, PyTorch, Keras, Scikit-Learn.
- **Web & Mobile Development:** Laravel PHP, Flutter framework.

## LANGUAGES PROFICIENCY

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- **English:** Advanced (TOEFL iBT score: 94/120).
- **French:** Advanced (TCF score: B2).