# Mohamed Nennouche

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## Education

- **Centrale Méditerranée** — Marseille, France
  *PhD degree - Underwater Optical Wireless Communications* — *February 2023 - In progress*
  ***Courses:*** *Analog and digital communication, underwater optical communication, machine learning, deep learning, signal processing, signal modulation and demodulation, channel coding*

- **Ecole Nationale Polytechnique** — Algiers, Algeria
  *Engineering degree - Electronics; 17.5/20* — *September 2019 - July 2022*
  ***Courses:*** *Analog and digital electronics, embedded systems, embedded computing (C-C++), telecommunication, advanced signal processing, image processing, machine learning*

- **Ecole Nationale Polytechnique** — Algiers, Algeria
  *Master's degree - Signal and Telecommunication; 17/20* — *Septembre 2019 - July 2022*
  ***Courses:*** *Telecommunication, antenna, antenna processing, embedded computing, machine learning*

## Research Interest

- Underwater Optical Wireless Communications (UWOC)
- Deep Learning in Signal Processing and Information theory
- Computer Vision and Deep Learning in Medical imaging

## Publications

- **Manuscripts in Submission**:
  - **M. Nennouche**, MA. Khalighi, A. Dowhuszko, D. Merad, JM. Boï "Application of Machine Learning to Signal Detection in Underwater Wireless Optical Communication Links" *IEEE International Symposium on Communication Systems, Networks and Digital Signal Processing*

## Skills Summary

- **Languages**: Python, C, C++, SQL, Bash, VHDL, Matlab, Latex, Arduino, Mbed
- **Libraries**: Scikit-learn, TensorFlow, Keras, Pytorch, Pandas, Numpy, Matplotlib, Seaborn, Scipy, OpenCV
- **Tools and databases**: GIT, PostgreSQL, MySQL, SQLite
- **Platforms**: Linux, Windows, Arduino, Raspberry, AWS, GCP
- **Soft Skills**: Leadership, Project Management, Writing, Public Speaking, Time Management

## Experience

- **LIS Lab - Centrale Méditerranée** — On site
  *PhD Student (Full-time)* — *Feb 2023 - Present*
  - **Subject : Hybrid RF/Optical Links for Airborne-Underwater Data Communication**: During this thesis I will have to intervene mainly on three parts: 1) Optimize the optical communication in the seabed sensor network 2) Ensure an optimal optical communication between the central node of the sensor network and the platform above the water 3) Ensure the optical/RF conversion of the transmitted signal and ensure the sending of the data to a drone or a low orbit satellite.
  - **Technologies and tools**: Optical communication, Advanced signal processing, Hybrid telecommunication, Deep learning for telecommunication, Unsupervised Learning, Channel coding, Python

- **Centrale Méditerranée** — On site
  *Temporary teacher* — *Sep 2023 - Present*
  - **Role**: I teach at Ecole Centrale Méditerranée as a part-time lecturer, mainly for practical work and seminars on digital communications, the Internet of Things, 5G and 6G, and signal processing. Through these activities, I teach practical work to 3rd year students.
  - **Seminars and courses**: Seminar: Using optical wireless communications in today's world / Training : IoT for Smart Bulding with MQTT
  - **Tools and skills**: JavaScript, NodeJS, MQTT, LoRa, Optical Communications, Teaching, Wireless communications, Public speaking

- **Decathlon El Djazair** — On site
  *Data Analyst (Full-time)* — *July 2022 - Jan 2023*
  - **Role**: My role in the company is to lead the data team and to carry out the company's projects. This includes using the different data sources of Decathlon El Djazair (database, API, sheets...) and extracting analysis and dashboards to make business decisions.

- **Technologies and tools**: Python, SQL, PostgreSQL, AWS S3, AWS Redshift, AWS Quicksight, GCP, Google Data Studio, Excel

- **Paris-Saclay university** — On site
  *Intern (Full-time internship)* — *Sep 2021 - Nov 2021*
  - **Role**: In this internship, I was in charge of realizing a fully instrumented water rocket through the study and the realization, all under Mbed environment
  - **Technologies and tools**: C, C++, Mbed

- **3/4 School** — Remote
  *Organic chemistry teacher (Part-time)* — *Sep 2019 - July 2021*
  - **Role**: I was in charge of the organic chemistry module at the Ecole 3/4 for the preparation of students in their second year of preparatory classes for the national competitive entrance exam to engineering schools.
  - **Impact**: Course has been taken by 250+ students so far with 100% of success in the final exam.

- **Bomare Company** — On site
  *Engineers intern (Full time internship)* — *Mars 2021 - April 2021 and July 2021 - Sep 2021*
  - **Role**: I had the chance to do 2 internships at Bomare Company in the industrial projects department, the first internship was a discovery internship of the company, the second was a more concrete internship participating directly in the department's projects in the realization of an embedded systems project
  - **Technologies and tools**: C, C++, Arduino, ESP32

## Volunteer and Training Experience

- **Micro Club - University of Science and Technology Houari Boumediene** — Algiers, Algeria
  *Conducted 6 day online course on introduction to deep learning for robotics with Python.* — *Mar 2024*

- **13 minutes des jeunes chercheurs - Aix Marseille University** — Marseille, France
  *Participation as a speaker on the applications of my thesis topic to environmental protection.* — *Nov 2023*

- **Vision & Innovation Club - Ecole Nationale Polytechnique** — Algiers, Algeria
  *Voluntary experiences* — *Nov 2019 - Sep 2022*
  - **Sep 2022**: Conducted 3 days online introduction to Python for Machine Learning training.
  - **Dec 2020 - Dec 2021**: Manager of the club's finance, logistics and external relations department.
  - **Sep 2020 - Nov 2021**: Head of the E-lab, mechatronics laboratory of the club within the Electronics department.
  - **Nov 2019 - Dec 2020**: Member of the club's finance, logistics and external relations department.

## Projects

- **WaterRocket (Python package, Data visualisation, Aerodynamic simulation, PDF generation)**: This project is a Python package that allows to simulate the flight of a water rocket taking into account a number of physical and structural parameters of the rocket. This package allows to have a good number of visualization and to generate a PDF report of the flight. Tech: Python, Numpy, Pandas, Matplotlib, Reportlab.
- **Alzheimer disease stages detection and classification (Image Processing, Deep Learning, Biomedical Imaging)**: This project consists in the realization of a Deep Learning model allowing the classification between MRI images of Alzheimer's disease patients and healthy patients, and the classification of the different stages of the disease for the affected persons. This project implements a fusion of features in a HoG and a neural network followed by a KNN as a classifier and obtaining excellent results (about 98% accuracy). Tech: Python, Tensorflow, Keras, Scikit-learn, OpenCV
- **COPD detection (Machine Learning, Deep Learning, Signal Processing)**: The project consists of detecting patients with Chronic Obstructive Pulmonary Disease based on data from gas sensors placed on patients' masks using several CNN architectures. Tech: Python, Scikit-learn, Tensorflow, Keras, Scipy
- **Connected hives network (Web Development, Embedded systems, Internet of things)**: Project consisting in the realization of a network of connected hives, each hive contained a system of sensors allowing the feedback of environmental data and specific to the hive (proportion of CO2, temperature, humidity ...) all connected to a Raspberry Pi and allowing the visualization in the form of a dashboard on the internet of the information of the hives. Tech: C++, Arduino, ESP32, Raspberry Pi, MQTT

## Honors and Awards

- Business Challenge winner - Avril, 2021
- Injaz El Djazair Finalist - April, 2020
- 5th in the national ranking of the entrance exam to engineering schools - September, 2019