



Moh Rafik

RESEARCHER & ENGINEER

Via Giovanni Amendola 122 D/O, 70126 Bari, Italy

+39 3209407192 | rafikiitbhu@gmail.com | www.mohrafik.it | mohdrafik | moh-rafik-60789a90

"Live and let live."

Summary

I am an Data Scientist and MLOps Engineer, building highly scalable, production-grade systems. I architected a fault-tolerant, end-to-end ML pipeline using Kubernetes, Docker, FastAPI, MLflow, and AWS to automate CI/CD and rigorous experiment tracking. I specialize in bridging the gap between deep learning research and deployment, having engineered high-precision CNN/DNN architectures with automated data pipelines and optimized MLOps workflows.

Most recently at STIIMA-CNR, which is known for conducts research and innovation in intelligent systems and advanced manufacturing to enhance industrial competitiveness, sustainability in Italy, I developed a web server for large-scale data processing integrated with Unity-based remote visualization and further application. I have developed the Full-Stack Web Architecture with a custom CMS, real-time security dashboards, and automated API pipelines.

Previously, at INFN Bari, I contributed to the CMS experiment at CERN's LHC Geneva, I have developed, automated and commissioned quality control setups for detectors using sensors, microcontrollers, and hardware modules. I analyzed the sensor data using Machine Learning algorithm.

Before that, I worked as engineer on the INO-ICAL experiment in India, focusing on detector prototyping, front-end electronics, and data acquisition systems(DAQ) for RPC, GEM, and silicon detectors. My work spans across signal processing, data analysis, and detector system integration in experimental physics. With over 8 years in multidisciplinary international projects, I have built advanced data analysis pipelines, algorithms, and hardware systems for scientific applications.

I love to contributing to open-source and technical communities that work toward societal betterment. I am always open to new challenges and enthusiastic about learning new tools and technologies.

Skills

MLOps & Cloud Infrastructure	Docker, Kubernetes (K8s), CI/CD Pipelines, Containerization, Linux, Git, AWS
Data Science & Analytics	NumPy, Pandas, Matplotlib, Seaborn, Plotly, Statistics, Open3D
AI & Computer Vision	PyTorch, TensorFlow, Keras, scikit-learn, OpenCV
Backend & Architecture	FastAPI, Flask, REST APIs, SQLAlchemy, MySQL, SQLite, Uvicorn, Gunicorn
Languages	Hindi (Mother tongue), English (C1), Italian (A2)

Experience

Technical Projects

MLOps ENGINEER & DATA SCIENTIST

Bari, Italy

Oct 2025 - Present

- **End-to-End MLOps Pipeline & Scalable API Deployment**
 - **Tech Stack:** FastAPI, MLflow, Docker, Kubernetes (Minikube), AWS PostgreSQL, GitHub Actions.
 - **Model Tracking & CI/CD:** Architected an automated continuous integration pipeline using GitHub Actions and integrated MLflow for rigorous experiment tracking, parameter logging, and model registry.
 - **Cloud Infrastructure:** Deployed a centralized MLflow tracking server connected to an AWS PostgreSQL database, ensuring persistent, secure, and remote storage for model metrics and artifacts.
 - **Orchestration & Serving:** Containerized a robust FastAPI inference application using Docker and orchestrated the complete system deployment on a Kubernetes (Minikube) cluster to ensure a highly scalable, fault-tolerant production environment.
- **Developed and deployed a full-stack robust web application: Custom CMS & Security Dashboard**
 - **Tech Stack:** Python, Flask, SQLAlchemy, MySQL/SQLite, Gunicorn, Railway, Integrated third-party APIs(Resend API).
 - Deployed a robust, dynamic web application using Python and Flask, implementing a flexible SQLAlchemy ORM that intelligently transitions between local SQLite environments and production MySQL databases for scalable data management.
 - Developed a custom Markdown-based Content Management System (CMS) and a live administrative dashboard featuring IP-API visitor geolocation, real-time navigation tracking, and advanced middleware security protocols to actively block malicious directory probing.
 - Led the end-to-end cloud deployment lifecycle via Railway and Gunicorn, establishing automated third-party API pipelines (Resend API) for secure, instant email communication and advanced spam prevention.
- **Deep Learning: Computer Vision & Digit Recognition**
 - **Tech Stack:** Python, PyTorch/TensorFlow, NumPy, OpenCV.
 - Designed and trained a custom Deep Neural Network (CNN/DNN) architecture for high-precision image classification using the benchmark MNIST dataset.

- Built an end-to-end automated data pipeline in Python to handle image preprocessing, normalization, and batch generation for training and evaluation phases.
- Executed advanced hyperparameter tuning (e.g., learning rate optimization, dropout regularization) and architectural refinements to prevent overfitting, achieving a classification accuracy exceeding 98%.

Institute of Intelligent Industrial Systems and Technologies for Advanced Manufacturing (STIIMA-CNR)

Bari, Italy

RESEARCHER

May 2023 – October 2025

- **Developed semi-automatic Python algorithms to segment 3D point-cloud representations of structural data, uncovering complex hidden substructures**
 - Developed robust Python code to determine optimal thresholds for 3D data segmentation.
 - Applied K-means clustering to divide volumetric data into distinct regions representing substructures of cells.
 - Reconstructed and visualized segmented data in 3D using both Python (Matplotlib) and MATLAB.
- **Developed Flask-Based API System for Real-Time 3D Data Processing and AR/VR Visualization**
 - Designed a real-time processing system combining Unity3D (as a remote client), a Python-Flask API, and a background processing server.
 - Developed server-side Python modules for background data clustering and invoked them via Flask triggered by Unity.
 - Enabled immersive data visualization through Unity's AR/VR environment, enhancing real-time feedback for volumetric reconstruction.
- **Automated Framework for Analyzing and Modeling AFM Protein Spectroscopy Data**
 - Built a modular Python framework to automate analysis of spectroscopy data from AFM protein samples on gold.
 - Implemented detection of minima, inflexion points, and flat regions in noisy data.
 - Removed outliers and visualized key regions of interest.
 - Applied linear regression and machine learning techniques for data modeling and fitting.

National Institute of Nuclear Physics (INFN)

Bari, Italy

RESEARCHER

Mar 2021 – Mar 2023

- Developed and tested front-end electronics and data acquisition systems for the CERN CMS experiment (GEM detectors). Characterized custom ASIC chips (VFAT3b) using a Modular Acquisition Board (MOSAIC) and analyzed performance data (e.g., calibration, optimal DAC settings, channel diagnostics) to ensure reliable operation.
- Led quality control for next-generation particle detectors (GEM chambers for the CMS GE2/1 upgrade).
- Automated test procedures using LabVIEW and microcontroller-based tools (Arduino). Conducted comprehensive QC tests (power/HV tests, gain uniformity, dead channel checks), improving the efficiency and accuracy of detector validation.
- Automated Raman peak detection, feature extraction, analysis, and visualization of extracted information from data files

University of Delhi, Department of Physics

New Delhi, India

RESEARCH ENGINEER

Mar 2015 – Mar 2020

- Contributed to R&D on advanced particle detectors (Resistive Plate Chambers and GEM detectors) for the CMS experiment and the India-based Neutrino Observatory (INO). Assembled and calibrated detector modules, performing key tests (gas leakage, gain uniformity, efficiency measurements) to meet experimental specifications in collaboration with international teams (CERN CMS Upgrade project).
- Developed digital signal-processing algorithms in MATLAB/C to reduce noise in detector signals and extract features (rise time, pulse width, etc.), significantly improving signal-to-noise ratio and particle detection accuracy. Also optimized FPGA firmware (Verilog/VHDL) for the detector readout electronics, enhancing data acquisition throughput.
- Designed and implemented automation tools for detector testing and monitoring – including LabVIEW interfaces for high-voltage control and current monitoring, and Arduino-based modules for environmental sensing – streamlining data collection and quality assurance. *(Co-authored multiple research publications based on this work.)*

Education

Indian Institute of Technology (IIT BHU)

Varanasi, India

MASTER OF TECHNOLOGY (M.TECH), DIGITAL TECHNIQUES AND INSTRUMENTATION

2012 – 2014

- Graduated with First Division (GPA 7.92/10).
- Thesis: *Recognition and Analysis of Facial Expressions using Support Vector Machine.*
- Face extracted from the standard image database. Feature extracted by comparing neutral and Six universal expressions are recognized with high accuracy of 95% .

IETE (Institute of Electronics and Telecommunication Engineers)

New Delhi, India

BACHELOR OF TECHNOLOGY (B.TECH), ELECTRONICS & TELECOMMUNICATION ENGINEERING

2004 – 2009

- Graduated with 7.18 CGPA (First Division)

Academic Achievements, Awards and Honors

2012 **Excellent Score 99.36 percentile with All India Rank :1127** , Graduate Aptitude Test in Engineering (GATE), MHRD, Govt. of India

India

2012–2014 **Awarded Scholarship for Master of Technology(M.Tech) Program**, by MHRD, Government of India

New Delhi, India

Certificates

- 2026 **Advanced Learning Algorithms (Machine Learning Specialization)**, DeepLearning.AI (Andrew Ng) and Stanford Online [Verify Certificate](#)
- 2018 **Certification in C and C++ programming with A1 grade**, National Small Industries Corporation (NSIC), New Delhi India
- 2017 **Course on computer concepts (CCC)**, National Institute of Electronics and Information Technology (NIELIT) Ministry of Electronics and Information Technology Govt. of India

Presentation

IEEE International Conference on Metrology for eXtended Reality, Artificial Intelligence and Neural Engineering

ST ALBANS - LONDON, UK

PRESENTER FOR < ADVANCING SUBSTRUCTURE ANALYSIS IN TOMOGRAMS >

OCTOBER 21-23, 2024

- Introduced tomography and its challenges in revealing hidden structures in 3D point cloud data.
- Introduced techniques for segmenting and advancing substructuring, and visualizing them immersively using extended reality and Unity.

Publications (Peer-Reviewed)

- **How Extended Reality Is Shaping Smart Cities: A Systematic Literature Review**
M. Ricci, N. Mosca, Moh Rafik, M. Di Summa
Applied Sciences, Vol. 16(2) (2026), 679
- **Uniformity study of large size glass RPC detector using an alternative front-end electronics for INO-ICAL experiment**
Aman Phogat, Moh Rafik, Ashok Kumar, Md. Naimuddin
Nuclear Instrumentation and Methods (NIM), Vol. 978 (2020), 164336
- **Testing and integration of front-end electronics for INO-ICAL RPCs**
Ankit Gaur, Aman Phogat, Moh Rafik, Ashok Kumar, Md. Naimuddin
Nuclear Instrumentation and Methods (NIM) A, Vol. 936 (2019), 366–367
- **New Front-end Electronics for INO-ICAL Experiment**
Aman Phogat, Ankit Gaur, Moh Rafik, A. Kumar, Md. Naimuddin
Nuclear Instrumentation and Methods (NIM) A, Vol. 905 (2018), 193–198
- **Development and commissioning of the HARDROC based readout for the INO-ICAL experiment**
A. Kumar, A. Gaur, Aman Phogat, Md Rafik, Md. Naimuddin
Journal of Instrumentation (JINST), Vol. 11, C10004 (2016)
- **Recognition of facial expression with mean distance matrices difference method and classification using support vector machine**
Moh Rafik, N.S. Rajput
International Journal of Scientific & Engineering Research (IJSER), Vol. 7, Issue 9 (2016), ISSN: 2229-5518

Autorizzo il trattamento dei miei dati personali presenti nel CV ai sensi dell'art. 13 del D. Lgs. 30 giugno 2003, n. 196 – "Codice in materia di protezione dei dati personali" – e dell'art. 13 del GDPR 679/16 – "Regolamento europeo sulla protezione dei dati personali".