Mehdi Ghrabli, PhD

mehdighrabli14@gmail.com +33 (0)6 25 50 59 08
Massy, France https://mehdighrabli.github.io

Education

2023 – 2026 **PhD** in Applied Mathematics, ENS Paris-Saclay. *Under the supervison of Ludovic Chamoin, Emanuel Aldea, and Mounira Bouarroudj.*
- Research in machine learning for predictive maintenance through time-series forecasting, surrogate modeling, and stochastic processes.

2021 – 2022 **Masters** MVA (Mathématiques, vision, apprentissage), ENS Paris-Saclay. *Graduated with highest honors.*

2019 – 2022 **Engineering degree** Applied mathematics, ENSTA Paris. Specialization in Optimization and Data Science. *Graduated with highest honors, 16.2/20 Grade.*

2017 – 2019 **Preparatory class** Mathematics and physics, Institut préparatoire aux études d'ingénieurs Tunis (IPEIT).

Professional experience

2023 **Freelance** Algorithmic trading based on a risk-return deep reinforcement learning algorithm.
- Implemented a deep reinforcement learning agent for portfolio optimization, using a Markov decision process framework and recurrent neural networks to model financial time series.

2022 **Research internship** Data-driven quantization of neural networks, Datakalab.
- Modified network architectures such as YOLO and ResNet at the layer level to reduce model size while maintaining high accuracy on CIFAR-10, ImageNet, and custom datasets.

2021 **Research internship** Statistical modeling for cross platform audience estimation, CREST-ENSAE.
- Modeled cross-media user behavior by developing and implementing Poisson-based latent class models.

Awards and distinctions

2024 **Best Presentation Award** Doctoral students' day SATIE, ENS Paris-Saclay, France.

2019 **Ranked First Nationwide** in the National Entrance Examination for Engineering Schools (Tunisia)

Skills

Programming Python
ML/DL PyTorch, TensorFlow, NumPy, Pandas
Miscellaneous Optimization, Probabilistic modeling, Statistics, Dynamic Time Warping

Research publication

Journal Articles

1 Ghrabli, M., Aldea, E., Bouarroudj, M., & Chamoin, L. (2026). Ai surrogate models for lifetime prediction in power electronic modules. *Microelectronics Reliability*, *180*, 116102.
doi:https://doi.org/10.1016/j.microrel.2026.116102

2 Ghrabli, M., Bouarroudj, M., Chamoin, L., & Aldea, E. (2025b). Physics-informed Markov chains for remaining useful life prediction of wire bonds in power electronic modules. *Microelectronics Reliability*, *167*, 115644. Introduces high-order physics-informed Markov chains for degradation modeling of power electronic modules using simulation and test-to-failure data, enabling cycle-by-cycle RUL estimation and extrapolation from experimental to real operating conditions. doi:https://doi.org/10.1016/j.microrel.2025.115644

Conference Proceedings

1 Ghrabli, M., Bouarroudj, M., Chamoin, L., & Aldea, E. (2025a, October). Data-driven Metamodels for Failure Analysis of Power Electronic Modules. In *36th European Symposium on Reliability of Electron Devices, Failure Physics and Analysis (ESREF 2025)*. Demonstrates how surrogate AI models accelerate numerical simulations for failure analysis, enabling accurate but computationally intensive autoregressive failure prediction. Université de Bordeaux, ADERA, Bordeaux, France. Retrieved from https://hal.science/hal-05323091

2 Ghrabli, M., Bouarroudj, M., Chamoin, L., & Aldea, E. (2024). Hybrid modeling for remaining useful life prediction in power module prognosis. In *2024 25th international conference on thermal, mechanical and multi-physics simulation and experiments in microelectronics and microsystems (EuroSimE)* (pp. 1–9). Studies the validity of Paris' law for modeling crack growth in power electronic modules and proposes a hybrid model that uses Paris' law within its domain of validity and a data-driven adaptive polynomial model outside it. doi:10.1109/EuroSimE60745.2024.10491493

Teaching experience

2023-2024 **Teaching assistant** Mathematical & numerical tools for management, IUT de Sceaux, Université Paris-Saclay

Activities and training

2022 **Competitive programming** Ranked 34/97 in the competitive programming competition SWERC (South Western Europe Regional Contest).

2016 **Maths and logic** Top 20 in the Tunisian national exam of mathematics and participation in the training course organized by the Tunisian association of mathematics (ATSM).

Languages

Arabic	Native
English	Professional working proficiency: 985/990 TOEIC score
French	Professional working proficiency