

# CHARILAOS MYLONAS, PH.D.

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## About

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I am a data science and scientific computing expert with over seven years of deep learning experience (PyTorch/TensorFlow) and a Ph.D. from ETH Zurich. My background features original contributions in generative models, geometric deep learning, and physics-informed deep learning, culminating in developing and open-sourcing a message-passing GNN library in TensorFlow. I possess extensive practical experience in generative AI, including RAG systems, LLM fine-tuning, and agentic frameworks like LangGraph. Furthermore, I have direct exposure to the application domains of financial risk (such as credit risk) and power-system simulation. Across my academic and consulting career, I have deployed scalable solutions using GCP, Docker, and Kubernetes, demonstrating impact by fostering maintainable software engineering and robust DevOps practices.

## Work Experience

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- AUG 2025 – CURRENT**     **EPAM, Zurich** Lead AI Engineer and Technical Consultant (Agentic AI/Full-Stack/DevOps)
- Architected the core backend framework for LangGraph-based GenAI agents for portfolio optimization and insights (Python, FastAPI)
  - Built an internal LangGraph evaluation and benchmarking library, enabling systematic reliability testing and a 35% reduction in token consumption.
  - Led integration of the agentic AI platform with two poorly documented legacy systems and created a modular, reusable orchestrator agent template.
  - Designed and implemented CI/CD pipelines (Terraform, Ansible, Docker, Gitlab).
  - Owned the authentication and authorization architecture for hybrid-cloud API integrations of the agent. Identified and drove the required governance processes to materialize the architecture, and implemented token exchange, secrets management, and internal PKI/TLS workflows.
- FEB 2025 – JUN 2025**     **Modulai, Basel** Senior Machine Learning Engineer (ended due to strategic branch closure)
- Implemented algorithms for large-scale community detection in transaction graphs, computed graph embeddings across the client's full user base of 35M+ users.
  - Extended the client's boosted decision tree-based fraud detection pipeline to automatically compute graph-derived features in a scalable manner, resulting in up to 7% reduction in false positive rate on test data.
- FEB 2022 – JAN 2025**     **Deloitte, Zurich** Senior Consultant; promoted to Assistant Manager in Sep 2024
- Co-organised early GenAI Incubator work on proof-of-concept RAG-based LLM prototypes and contributed to internal AI initiatives in NLP, graph machine learning, and compliance analytics.
  - Led internal AI enablement through Deloitte North & South Europe-wide sessions on NLP and graph machine learning, a Zurich machine learning community of practice, and mentoring of junior team members and peers.
  - Delivered AI, analytics, and financial-risk engagements across banking, compliance, blockchain, and energy-market use cases, combining hands-on machine learning engineering with client-facing advisory work.
  - Built a reproducible benchmarking framework for deep learning-based diarization and speech enhancement, enabling quantitative model comparison for a large Swiss bank's compliance department.
  - Developed Python interfaces for legacy R-based credit risk analytics tooling, supporting macro-sensitivity analysis of expected credit loss across a global portfolio.
  - Introduced software engineering best practices across client and internal engagements, improving version control, testing, project tracking, accountability, and maintainability.
  - Facilitated communication with stakeholders of varied seniority during a critical credit risk reporting project in the merger of two global systemically important banks.

- SEP 2016–NOV 2021 **ETH Zurich** Ph.D. Candidate/Research Assistant
- Implemented a message-passing GNN library (<https://github.com/mylonasc/tf-gnns/>).
  - Performed research on probabilistic ML for structural health monitoring and predictive maintenance of wind energy infrastructure (Python, TensorFlow, Graph Machine Learning, conditional VAEs).
  - Awarded Ph.D. with no corrections, and unanimously nominated from examination panel for the ETH Medal.
  - Engaged in industrial collaborations (raw data curation, deep learning for remaining useful life prediction, wind farm data processing).
  - Performed large-scale Monte-Carlo simulations (Bash, cluster computing, typical volumes processed 200GB to 2TB)
- DEC 2015–SEP 2016 **ETH Zurich** Research Assistant
- Contributed to the popular computational statistics software UQLab by implementing uncertainty quantification and sensitivity analysis algorithms.
- JUL 2014–DEC 2014 **Credit Suisse, Zurich** Full-Stack Trading Tool Developer (internship)
- Implemented and validated a high-level interface for an option pricer (C++ to R), achieving more than 10-fold improvement by replacing pre-existing interface.

## Education

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- SEPT 2016 – SEPT 2021 **ETH Zurich**  
Ph.D. in MACHINE LEARNING FOR STRUCTURAL HEALTH MONITORING UNDER UNCERTAINTY  
Advisor: Prof. Eleni Chatzi
- SEPT 2012 – SEPT 2015 **ETH Zurich**  
M.Sc. in COMPUTATIONAL SCIENCE AND ENGINEERING  
Specialization: Computational Electromagnetics  
Advisor: Prof. Ralf Hiptmair

## Technical Strengths

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| <b>Programming Languages</b>             | Python, Matlab, R   | ●●●●●● |
|  | C++, Java, JavaScript   | ●●●●○○ |
| <b>Other software development skills</b> | Linux, Docker, Kubernetes, Classical ML Algorithms, Scientific Computing, Software Design, Web Development, High Performance Computing, Retrieval Augmented Generation systems, Microcontroller Programming   |        |
| <b>Deep Learning</b>                     | Probabilistic Generative Models (GANs, VAEs, Normalizing Flows, Denoising Diffusion models), Graph Neural Networks, Strong familiarity of all core Deep Learning architectures (gated RNNs, CNNs, Attention Mechanisms & Transformers) and how they apply to different data modalities (text, audio, images, tabular data). |        |

## Other Information

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### Teaching assistant roles

- High Performance Computing for CSE (C++, OpenMP) (2020) (Prof. O. Schenk).
- Method of Finite Elements (Matlab, Python) (2017 – 2019) (Prof. E. Chatzi).

### Other academic engagements

- *Mentorship*: Serving as mentor for Ph.D. students at ETH Zurich (upon invitation).
- *Student project supervision*: 6 MSc theses and semester projects and consulted on several others.
- *Reviewer assignments*: for Mechanical Systems and Signal Processing and Journal of Sound and Vibration.

### Distinctions and certificates

- **Best paper award** in 39th IMAC conference (Feb. 2021).
- **SIAM Gene Golub Scholarship** for Ph.D. summer school on “*High-Performance Data Analytics*” Aussois, France 2019.

## Selected Publications

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Please refer to [Google Scholar \[link\]](#) for full list and updated citation count.

**Mylonas, C.** (*ETH Ph.D. Dissertation*) Machine Learning for Structural Health Assessment under Uncertainty, with applications in Wind Energy, [\[link\]](#)

**Mylonas C., Chatzi E.** Remaining Useful Life Estimation for Engineered Systems Operating under Uncertainty with Causal GraphNets. *Sensors*. 2021; 21(19):6325. <https://doi.org/10.3390/s21196325>

**Mylonas, C., Abdallah, I., Chatzi, E.** Conditional variational autoencoders for probabilistic wind turbine blade fatigue estimation using SCADA data. *Wind Energy*. 2021; 1- 18. <https://doi.org/10.1002/we.2621>

**Lai, Z., Mylonas, C., Nagarajaiah, S., & Chatzi, E.** Structural identification with physics-informed neural ordinary differential equations. *Journal of Sound and Vibration*, 508, 116196.

**Mylonas, C., Abdallah, I., Chatzi, E.** (2021) Relational VAE: A Continuous Latent Variable Model for Graph Structured Data [\[link\]](#)

**Mylonas, C., Tsioliamanis, G., Worden, K. & Chatzi, E.** Bayesian graph neural networks for strain-based crack localization. (*39th IMAC conference proc.*) [\[link\]](#)

**Mylonas, C., Abdallah, I., & Chatzi, E.** (2020). Deep Unsupervised Learning For Condition Monitoring and Prediction of High Dimensional Data with Application on Windfarm SCADA Data. *In Model Validation and Uncertainty Quantification, Volume 3 (pp. 189-196)*. Springer, Cham.