

# Vittoria De Pellegrini

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— 🌐 [github.com/VittoDePe98](https://github.com/VittoDePe98) — 🐳 [hub.docker.com/u/vittodepe98](https://hub.docker.com/u/vittodepe98) — 🎓 [scholar.google.com](https://scholar.google.com) — 🌊 [deepwave.kaust.edu.sa/people](https://deepwave.kaust.edu.sa/people)

## Professional Summary

Italian-Brazilian PhD student at King Abdullah University of Science and Technology (KAUST) and Doctoral Researcher with the industry-funded DeepWave Consortium, an initiative that builds machine- and deep-learning workflows for subsurface reservoir characterization. I focus on deep generative AI—especially video diffusion models—to model multi-phase subsurface fluid-flow dynamics. My workflows rely on CUDA-aware, reproducible CPU/GPU parallel computing pipelines running at scale on the KAUST IBEX Supercomputing cluster.

## Skills

**Programming & Tooling:** Python, C++, Visual Studio Code, Git/GitHub, Docker/Docker Hub, Linux terminal workflow  
**Machine/Deep Learning & Generative AI:** Supervised, semi-supervised, and unsupervised learning; linear/logistic regression; random forest; gradient boosting; image segmentation; neural networks; fine-tuning workflows; diffusion models (conditional, latent, video); progressive autoregressive video diffusion models; diffusion transformers; latent space engineering; VAE/VQ-VAE/VQ-GAN (2D/3D)  
**Python Libraries:** PyTorch, TensorFlow, Hugging Face Transformers, Accelerate, Optuna, TensorBoard, NumPy, Pandas, Scikit-Learn, scikit-image, Matplotlib, Seaborn, Folium, Dlisio, Lasio, OPM Flow, pyopmspe11 (SPE11 benchmark), Pickle, JSON, QB Styles  
**High-Performance Computing:** CPU/GPU parallel programming, CUDA job scripting, KAUST IBEX Supercomputing  
**Productivity & Collaboration:** Microsoft Word, Excel, PowerPoint, Overleaf, LaTeX, Slack, Zoom

## Professional Experience

**DeepWave Research Consortium, KAUST — Doctoral Researcher** Jan 2024 – Present  
Thuwal, Saudi Arabia  
– Build deep generative models for multi-phase subsurface fluid-flow dynamics.  
– Build latent conditional diffusion models and latent progressive autoregressive video diffusion models tailored to reservoir simulation data.  
– Generate video sequences of key field variables such as CO<sub>2</sub> gas saturation and pressure build-up evolution in the subsurface for CO<sub>2</sub> geological sequestration studies.  
– Run large-scale training and inference experiments on the KAUST IBEX multi-GPU cluster through CUDA-aware job scripts and CPU/GPU parallel workflows.

**Politecnico di Torino (PoliTO) — Graduate Researcher** Feb 2023 – Jul 2023  
Turin, Italy  
– Developed supervised machine learning models for conventional and advanced well-log prediction.  
– Applied the models to wells from the São Francisco and Santos basins in Brazil using PETROBRAS datasets.

**Aramco Overseas Company B.V. — Geophysics Intern** Sep 2022 – Nov 2022  
Delft, Netherlands  
– Built a 3D multi-physics synthetic model for a geothermal site in Saudi Arabia.  
– Generated surface wave dispersion curves.  
– Produced synthetic seismograms.

## Education

**King Abdullah University of Science and Technology (KAUST)** Jan 2024 – Dec 2027 (Expected)  
Thuwal, Saudi Arabia  
*Doctor of Philosophy in Earth Science and Engineering — GPA 3.89*

**Politecnico di Torino (PoliTO)** Oct 2020 – Jul 2023  
Turin, Italy  
*Master of Science in Petroleum Engineering — Grade 108/110*

**Università degli Studi di Padova (UniPD)** Oct 2017 – Jul 2020  
Padua, Italy  
*Bachelor of Science in Civil Engineering — Grade 110/110*

**Liceo Scientifico Statale Giordano Bruno** Sep 2012 – Jun 2017  
Venice, Italy  
*High School Diploma*

**Orewa College** Jul 2015 – Sep 2015  
Auckland, New Zealand  
*Exchange Summer Student*

## Languages

Italian — Bilingual • Brazilian Portuguese — Bilingual • English — Advanced • Spanish — Intermediate • Khaliji Arabic — Basic

## Conference Publications

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**V. De Pellegrini**, D. Wamriew, T. Alkhalifah. (2025, June) “A Conditional Diffusion Model for CO<sub>2</sub> Monitoring and Forecasting in Heterogeneous Geological Formations.” *86th EAGE Annual Conference & Exhibition* (Vol. 2025, pp. 1 - 5). European Association of Geoscientists & Engineers.

**V. De Pellegrini**, T. Alkhalifah. (2025, August) “Towards Generative Modeling of CO<sub>2</sub> Geological Storage with Latent Conditional Diffusion Models.” *Fifth International Meeting for Applied Geoscience & Energy*. SEG/AAPG, Expanded Abstracts.

## Thesis

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**V. De Pellegrini**. “Development of Supervised Machine Learning Models for the Prediction of Well-Logs & Application on Wells at São Francisco and Santos Basins, Brazil.” Master’s Thesis, Politecnico di Torino, 2023.