

Nadia Hamlaoui

Deep Learning Engineer

Heidelberg, Germany | +49 174 788 7819

nadia.hamlaoui.97@gmail.com | LinkedIn



Profile

Deep Learning Engineer specializing in large-scale **computer vision**, **Generative AI**, **LLMs**, and **multimodal systems**, with 4 years of industry experience delivering high-performance ML solutions from research to production. Expertise in **deep learning architectures**, **PyTorch**, **CUDA**, **TensorRT**, **distributed training**, **model optimization**, **GPU-accelerated inference**, and **real-time AI systems**, with a strong focus on **model efficiency**, **scalability**, and **end-to-end ML infrastructure**.

Professional Experience

Copresence GmbH, Heidelberg, Germany

2022–2026

Machine Learning Engineer — Vision, Generative AI & ML Systems

- Developed multi-task facial analysis models for **segmentation**, **surface normals**, **canonical geometry**, **landmarks**, and **facial attributes**, using shared representations across related vision tasks.
- Developed **probabilistic facial and hair attribute models** using uncertainty-aware objectives and directional statistics, including **von Mises loss**, for robust estimation under noisy and ambiguous data.
- Developed **diffusion-based image generation and inpainting** using latent diffusion, cross-attention conditioning, and transformer architectures, including identity-preserving reconstruction with perceptual and adversarial losses and PCA-based priors.
- Developed **multi-view texture synthesis and delighting** for neural avatars using **DeepSets-based permutation-invariant feature aggregation**, UV-space representations, multi-view projection, generative texture prediction, and color correction to produce consistent appearance across viewpoints.
- Built real-time **face detection and analysis** models robust to pose, scale, occlusion, and lighting variations, including a YOLO-inspired FaceBoxes detector trained with domain randomization.
- Developed **skin and eye color estimation** using self-training and pseudo-labeling, alongside an annotation tool and curated dataset to improve label quality and supervision.
- **Pretrained ResNet models on domain-specific facial data** and fine-tuned them for downstream tasks, achieving better performance than standard **ImageNet-pretrained** initialization.
- Optimised **neural rendering and avatar systems** for multi-view appearance learning, texture synthesis, UV-space modeling, and real-time rendering.
- Built **multimodal AI systems** combining vision models, LLMs, RAG, speech processing, and neural rendering; adapted LLMs using **LoRA/PEFT** and retrieval-based context injection.
- Implemented and optimized **large-scale training and GPU inference** using PyTorch DDP, mixed precision, gradient checkpointing, multi-GPU training, TensorRT, ONNX Runtime, TorchScript, CUDA, operator fusion, quantization, and transformer KV-cache/attention optimizations.
- Built a **3D avatar validation and geometry evaluation system** using studio-captured ground truth and multi-view depth fusion, with signed surface distances, **collision detection**, UV-space error heatmaps, region-level statistics, and automated multi-view visualization for quantitative reconstruction analysis.
- Designed **physically based shading and capture simulations** in Blender using Principled BSDF, reproducing studio conditions and correcting subsurface-scattering and specular biases through learned remapping matrices.

Selected academic projects

Event-based Gesture Recognition – TU Dresden

- Developed neuromorphic vision models using Spiking Neural Networks and event-based processing for low-power edge AI for gesture recognition.

AI Cybersecurity Systems – Acredius

- Built ML-based cyber intrusion detection systems using supervised and unsupervised learning methods.

Technical Skills & Expertise

Machine Learning & Generative AI:

Computer Vision, Multimodal AI, Vision-Language Models, Diffusion Models, GANs, Latent Diffusion, Representation Learning, Neural Rendering, Self-Supervised Learning, Probabilistic Modeling

LLMs & Transformers:

Transformers, Vision Transformers, RAG Systems, Embedding Models, Cross-Attention, LoRA/PEFT concepts, KV-Cache Optimization, Token Streaming

Distributed Training & ML Systems:

PyTorch DDP, Mixed Precision (FP16/AMP), Gradient Checkpointing, Multi-GPU Training, CUDA Optimization

Inference Optimization & Deployment:

TensorRT, ONNX Runtime, TorchScript, CUDA Profiling, Quantization (FP16/INT8), Operator Fusion, Low-Latency Inference

Frameworks & Libraries:

PyTorch, TensorFlow, OpenCV, scikit-learn, FAISS, HuggingFace Transformers, Diffusers

Programming & Infrastructure:

Python, C++, CUDA, Linux, Git, Shell, YAML

Education

National Engineering School of Tunis (ENIT)

M.Eng. in Information & Communication Technology

Tunisia

2019 – 2022

Lycée Louis-le-Grand

Preparatory Classes in Mathematics & Physics (MPSI/MP*)

Paris, France

Talks & Conferences

- MWC (Barcelona, Spain)
- 3DBody.Tech (Lugano, Switzerland)
- GCPR (Heidelberg, Germany)
- Cannes FilmTech (Cannes, France)

Awards

- DAAD Scholarship – TU Dresden
- Excellence Scholarship (Top Baccalaureate ranking) for studies abroad
- US Young Physicists’ Tournament – 5th Place

Languages

Arabic (Native) • French (C1) • English (C1) • German (A2)