Jasser Kraiem

Imaging, Vision & Machine Learning

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PROFILE

I am a master's student in Electrical Engineering and Information Technology at the Technical University of Munich (TUM), graduating in 2027. I am currently writing my master's thesis at NXP Semiconductors in collaboration with the Chair of Media Technology at TUM. Through my academic work as well as industry projects, I have worked along the whole image and video pipeline: data capture, analysis, processing, modeling, training, optimization and deployment on NPUs and edge AI accelerators. I especially enjoy designing the image and video pipelines that make AI models come alive on real hardware. I work where theory meets deployment: I first lay the mathematical foundations of a problem, then turn them into a solution that fits the hardware budget and meets customer expectations. My goal is a solution that is robust by design and holds up in real deployment, not one tuned to a benchmark or built for a demo. I want to deepen these foundations, especially in probabilistic generative models, image reconstruction, denoising and learned compression, and keep carrying them into real industrial products.

EDUCATION

Technical University of Munich (TUM), Germany — 10/2024 – 09/2027 (expected)

- M.Sc. Electrical Engineering and Information Technology · Current grade: **1.6**
- Focus: signal processing, machine learning, deep learning, computer vision, embedded systems
- Master's thesis: *Sensor-Agnostic Raw Image Denoising*, NXP Semiconductors & Chair of Media Technology

Technical University of Munich (TUM), Germany — 10/2021 – 09/2024

- B.Sc. Electrical Engineering and Information Technology · Grade: **2.0**
- Focus: signal processing (audio, image, radar)
- Bachelor's thesis: *Maximizing Deep Neural Network Efficiency in NPU-Accelerated Image Processing*, NXP Semiconductors

Studienkolleg Hannover / Leibniz University Hannover, Germany — 10/2020 – 07/2021

- University entrance qualification exam (Feststellungsprüfung) · Grade: **1.4**

Pioneer High School of Monastir, Tunisia — 09/2016 – 06/2020

- Baccalaureate in Technical Sciences, **ranked 1st nationwide** · Grade: **1.1** (German scale)

EXPERIENCE

NXP Semiconductors, Munich

Master's Thesis Intern · Sensor-Agnostic Raw Image Denoising — 08/2026 – present

In collaboration with the Chair of Media Technology, TUM

- Developing a raw image denoiser that generalizes across camera sensors without per-sensor retraining
- Modeling and synthesizing sensor noise to generate realistic training data
- Designing the network for efficient deployment on embedded hardware

Research Intern (Forschungspraxis) · Joint Image Denoising and Compression — 03/2026 – 04/2026

- Investigated single-frame denoising directly in the latent space of a learned image codec (pretrained convolutional autoencoder, frozen encoder/decoder), combining denoising and compression in one pipeline
- Showed that latent-domain denoising outperforms the equivalent pixel-space baseline and that latent quantization adds no denoising loss, so both fit one pipeline at no extra bitrate
- Identified model size as the barrier to edge deployment and proposed a multi-frame extension that exploits temporal redundancy to reach the same quality with smaller models

Working Student · Edge AI Deployment & Video Pipelines 07/2024 – 07/2026

- Deployed real-time computer vision models (YOLO detection and segmentation) on the **NXP i.MX 95** (Arm CPU + eIQ Neutron NPU) with **TensorFlow Lite** and the Neutron delegate; built the full C++ inference path (preprocessing → inference → postprocessing) at **≥ 30 FPS**
- Designed and implemented **GStreamer** video pipelines for streaming, recording and AI inference running concurrently
- Engineered buffer-level flow control, including temporal filtering across frames and display-buffer management, to keep the real-time pipeline smooth under load
- Built real-time rendering with interactive UI overlays, driven by asynchronous event handling and a multithreaded architecture

Bachelor's Thesis Intern · DNN Efficiency in NPU-Accelerated Image Processing 04/2024 – 06/2024

- Optimized CNN-based denoising models for NPU deployment using neural architecture search (NAS), pruning and quantization, and profiled their performance and efficiency on the target AI accelerator
- Matched the image quality of classical denoising methods while running within the target hardware's compute budget

Working Student · AI-Driven Image Signal Processing 01/2024 – 03/2024

- Tested and ran inference of deep learning models for AI-driven ISP, such as denoising and end-to-end ISP

Working Student · Mixed-Signal IP 12/2022 – 12/2023

- Measurement setups, soldering and bare-metal programming of test boards

TUM Data Innovation Lab, Industry project with MARTIN GmbH

Thermal Camera Analysis for Waste-to-Energy Plants 10/2025 – 02/2026

Team of 5; report: Using Infrared Imaging to Predict Waste-to-Energy Power Plant Behaviour

- Detected and quantified waste drops onto the furnace grate from noisy, highly dynamic infrared (IR) footage
- Flagged ash-obscured frames with texture and sharpness statistics (coefficient of variation, Laplacian variance)
- Estimated waste amount from its cold-spot signature via per-cycle minimum tracking and Otsu thresholding, plus a thermal mass index for pile density; explored deep video models for drop detection

Technical University of Munich, Chair of Methods of Signal Processing

Teaching Assistant 10/2022 – 07/2023

- Led tutorials for Circuit Theory (WS 22/23) and System Theory (SS 23)

RESEARCH & WRITING

End-to-End Learned Image Compression: Approaches, Deployment, and Standardization 2026

J. Kraiem, Z. Chen. Seminar paper, Chair of Media Technology, TUM

- Reviewed VAE-based learned image compression and benchmarked representative models on a Tesla T4 GPU to assess deployability; examined the JPEG AI standard

From Probabilistic Modeling to Generative Modeling 2025

- Six-part article series at jasserkraiem.com, from Gaussian mixtures to VAEs, normalizing flows, GANs and diffusion models, with full derivations

PROJECTS

Real-Time Waste Detection on Edge AI · START Munich Hackathon, One Ware challenge 11/2025

- Built a complete edge AI solution in 24 h on One Ware's platform: collected an image dataset, preprocessed and augmented it (grayscale conversion, cropping), then designed and trained a CNN
- Compiled the model for a **Hailo-8L** accelerator and ran it in real time in a **GStreamer** pipeline with an NNStreamer-based inference plugin, counting cans and other waste in a shared workspace and notifying staff once a threshold was reached
- Showed that the platform takes a business case from raw data to a deployed solution in under 24 h

Vision-Based Descent Control for Airdropped Payloads 06/2025

- Built a real-time vision pipeline that steers a free-falling payload's orientation with servo motors
- Combined classical OpenCV detection with YOLOv8 inference on a Hailo-8L AI accelerator

Study Focus Monitor · TechLabs Digital Shaper Program 04/2025 – 07/2025

- Built a real-time attention monitor with an edge-cloud pipeline based on MediaPipe FaceMesh
- Engineered time-series features from facial landmarks and trained SVM and XGBoost classifiers

MedVoice: AI Phone Assistant · CDTM Hacks 05/2025

- Co-developed a conversational phone assistant for accessible healthcare; built the OCR and prompt-engineering backend that extracts data from patient documents

Self-Balancing Robot · EESTEC Embedded Systems Challenge 05/2025

- Implemented and tuned a PID controller for stable balance, forward motion and turns on real hardware

Networked Board Game · Adveisor Program, **1st place** 11/2021 – 07/2022

- Built a remotely playable *Settlers of Catan* in a team; programmed the Arduino game-state logic and did the hardware soldering

SKILLS

Programming	Python, C, C++, MATLAB, Julia
ML & Deep Learning	PyTorch, TensorFlow/Keras, TensorFlow Lite, scikit-learn
Computer Vision	OpenCV, GStreamer, YOLOv8, MediaPipe
Model Optimization	Neural architecture search, pruning, quantization
Embedded & Edge AI	NXP i.MX 95, Hailo-8L, Raspberry Pi, STM32, Infineon XMC4500, Arduino
Data & Tools	NumPy, pandas, Matplotlib, Git, Docker, Linux
Lab	Measurement, soldering, PCB design

LANGUAGES & INTERESTS

Languages	Arabic (native) · German (fluent) · English (fluent) · French (fluent)
Interests	Martial arts (kickboxing, boxing, taekwondo) · Running · Writing about machine learning