

# Thomas Kreutz | Dr. rer. nat.

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🔗 <https://scholar.google.de/citations?user=BGk0i0wAAAAJ>

**Professional Summary:** I am a passionate computer scientist, specialized in **scene understanding** and **spatio-temporal ML**. I thrive in fast-paced, applied environments and can learn new domains quickly (**Ph.D. in 3.5 years w/ 7 first-author publications** at top venues like ICCV, ICRA, IROS, WACV).

## Education

**Computer Science, Ph.D. (magna cum laude), Technical University of Darmstadt, Telecooperation Lab.** 02/2022 – 07/2025

- Ph.D. Thesis: "Towards LiDAR and IMU-Based Human-Centric Scene Understanding in the Context of Urban Environments" (available at <https://tuprints.ulb.tu-darmstadt.de/id/eprint/31055>)

**Computer Science, M.Sc., Technical University of Darmstadt, Computer Science Department.** 2019 – 2021

- Master's Thesis: "Driving Event Discovery based on Vehicle CAN-data", graded 1.0 (scale 1.0-5.0, 1.0 best)

**Computer Science, B.Sc., Technical University of Darmstadt, Computer Science Department.** 2013 – 2019

- Bachelor's Thesis: "Towards Enforcing Dynamic Security Policies in Java Programs", graded 1.0 (scale 1.0-5.0, 1.0 best)

## Research & Work Experience

**Research Associate (PhD Student), Telecooperation Lab, Technical University of Darmstadt.** 02/2022 – 07/2025

- **PhD completion:** Individual doctorate finished in 3.5 years (**cumulative thesis**), ahead of German average (~5–6 years).
- **Research scope:** **Scene understanding** with **spatio-temporal data** (e.g., LiDAR point clouds, IMU time series, vehicle CAN-data, 2D trajectories, RGB, human skeleton poses, natural language). Main topics: **Representation Learning**, **LiDAR Moving Object Segmentation**, **Unsupervised Domain Adaptation for LiDAR Semantic Segmentation**, **Crowd Simulation**, **Multimodal Contrastive Learning**, **HAR**, **Cross-modal Person Re-ID**, **Cross-modal Temporal Moment Retrieval**, **Unsupervised Time-series Segmentation**.
- **Publications & talks:** 7 **first-author publications** (ICCV, ICRA, IROS, WACV, ITSC, CVPRW, ICLR Tiny papers track). 6 in-person conference participations (USA×4, Austria×1, UAE×1); given 4 technical talks (at WACV23, IROS24, ICRA25, ITSC22). All my publications can be found on my Google Scholar profile (<https://scholar.google.de/citations?user=BGk0i0wAAAAJ>) or my personal webpage (<https://thkreutz.github.io>).
- **Programming:** Built **reproducible end-to-end ML pipelines** (data collection/ingestion → preprocessing → DL models → training → evaluation → visualization) in **Python** with libraries such as **PyTorch/TensorFlow**, **Weights & Biases** (**wandb**), **NumPy**, **Pandas**, **Open3D**, **Pyplot/Seaborn**. Datasets: *autonomous driving* (e.g., KITTI, SemanticKITTI, Argoverse, nuScenes), *crowds/trajectories* (Grand Central Station, ETH/UCY, SDD, ATC, Edinburgh Forum), *human activity/pose* (MSR-Action3D, HMPEAR, LIPD, NTU-RGB+D, AMASS, BABEL).
- **Project leadership & management:** Alumni of the **Software Campus Program** (funded by the German Federal Ministry of Education and Research - BMBF), where I conceptualized, planned, led, and carried out a **2-year** research project with **€100,000** budget (<https://softwarecampus.de/en/>). Planned and wrote the full research project proposal (research, work packages, milestones, budget) and completed leadership/PM trainings (see "Personal Development").
- **Dataset collection:** As part of my Software Campus Project, I planned and led the collection of a multimodal dataset for HAR and cross-modal re-ID (**2× Velodyne VLP-16, 1× GoPro Hero 8, 10× Xsens DOT IMUs; 2 subjects, 4 scenes, 20 sequences of 10 min each**). As part of supervising an M.Sc. Thesis, I conveyed the idea and supervised the collection of a handwriting recognition dataset using **IMU data from Apple Smartwatches (15 subjects)**.
- **Supervision & teaching:** Supervised **8 final year theses** (5 M.Sc., 3 B.Sc.). Topics: LiDAR object detection/panoptic segmentation, domain adaptation, smartwatch-IMU handwriting recognition, LiDAR+IMU HAR collection, diffusion models for time series; Taught a **practical course on Android app development (Internet Practical Course Telecooperation, WiSe 2025)**, where I and 3 other colleagues supervised **12 groups with 4-6 members each**.

**Machine Learning Engineer, COMPREDICT GmbH, Darmstadt.**

11/2021 – 01/2022

Collaboration on a research project for a well-known French automobile manufacturer

- Deep learning-based **anomaly detection** on the measurement time series data of a **high-voltage battery** for electric vehicles using **supervised contrastive learning**, including data pre-processing, visualization, and evaluation
- Anomaly detection in **diagnostic trouble codes** during high-voltage battery charging with **association rule mining**.

**External Master's Thesis Researcher, COMPREDICT GmbH, Darmstadt.**

**04/2021 – 11/2021**

Working on my master's thesis *Driving Event Discovery based on Vehicle CAN-data* on site for the company, including:

- Development of an **unsupervised machine learning approach** to discover **driving events** in **vehicle CAN-data** from a **Tesla Model 3** vehicle without any supervision; Manual collection and annotation of around 1 hour of vehicle CAN-data.

**Student Research Assistant, MAIS, Technical University of Darmstadt.**

**05/2019 – 06/2020**

- Implementation of a **packet-in flooding DDoS attack** against the **Floodlight SDN controller** in **Mininet**.
- Research into countermeasures and their implementation in a **Dynamic Enforcement Framework** named **CliSeAu**.
- Program code inspection of the **Floodlight SDN controller**.

## Awards & Achievements

**1st Place Winner – Hafnia Hackathon 2025**, Milestone Systems and NVIDIA.

**13/10/2025 – 11/11/2025**

- **Project:** AskTheCity – A social-network-style web app that uses a **VLM** via API to turn live city cameras (YouTube livestreams) into sources for instant, privacy-aware answers to user questions about the scene a camera records.
- **Tech stack:** Hafnia VLM-aaS, Python (Flask, requests, ollama, folium, yt-dlp), SQLite, JavaScript, CSS, HTML.
- **Press release:** <https://www.milestoneys.com/company/news/press-releases/developers-innovate-safer-video-intelligence/>

**Software Campus Program**, German Federal Ministry of Education and Research (BMBF).

**04/2023 – 04/2025**

- Competitive leadership and research program combining **industry collaboration**, **project management**, and **technical leadership** with a €100,000 funded research project.

## Personal Development

**Agility in Practice (SCRUM) — DATEV Agile Camp**, Datev AG, Nürnberg.

**12/2023**

**Successful Negotiation in the Business Context**, Trumpf SE + Co. KG, Ditzingen.

**09/2023**

**Innovation Management**, Huawei Technologies Düsseldorf GmbH, München.

**11/2023**

**Diversity - Leading Diverse Teams and Fostering Potential**, Volkswagen AG, Wolfsburg.

**10/2023**

**Understand Yourself and Others Better - Insights Discovery Workshop**, Merck KGaA, Darmstadt.

**09/2023**

**Effective Leadership Communication**, Carl Zeiss AG, Oberkochen.

**06/2023**

## Technical Skills & Competences

**Language:** German (native), English (C1/C2 level), French (A1 level)

**Programming Languages:** Python, C#, Java

**ML Tools and Libraries:** PyTorch, TensorFlow, Scikit-Learn, SciPy, NumPy, Pandas, PyPlot, Seaborn, Open3D

**ML Models and Deep Learning:** Hidden Markov Model (HMM), k-means, DBSCAN, HDBSCAN, TICC, single-linkage hierarchical clustering, Multilayer Perceptron (MLP), Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), Convolutional Neural Network (CNN), Transformer, Vision Transformer (ViT), Set Transformer, Autoencoder (AE), Variational Autoencoder (VAE), β-VAE, Generative Adversarial Network (GAN), Graph Neural Network (GNN), Neural Cellular Automata (NCA), Cellular Automata (CA)

**Other Skills:** Unity, LaTeX, Git, MS Powerpoint, VeloView, Carla, Wireshark, Software-defined Networking (SDN), Dynamic Enforcement, Aspect-oriented programming (AOP), Mininet

## Selected Peer-Reviewed Publications

**DeSPITE: Exploring Contrastive Deep Skeleton-Pointcloud-IMU-Text Embeddings for Advanced Point Cloud Human Activity Understanding**, Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea.

**Whenever, Wherever: Towards Orchestrating Crowd Simulations with Spatio-Temporal Spawning Dynamics**, Thomas Kreutz, M. Mühlhäuser, A. S. Guinea.

**LiOn-XA: Unsupervised Domain Adaptation via LiDAR-Only Cross-Modal Adversarial Training**, Thomas Kreutz, Jens Lemke, M. Mühlhäuser, A. S. Guinea [Oral].

**Unsupervised 4D LiDAR Moving Object Segmentation in Stationary Settings with Multivariate Occupancy Time Series**, Thomas Kreutz, M. Mühlhäuser, A. S. Guinea.

Full list of publications: <https://scholar.google.de/citations?user=BGk0i0wAAAAJ>