

# Thomas Kreutz, M.Sc.

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## Professional Summary

Ph.D. candidate at TU Darmstadt specializing in human-centric urban scene understanding and LiDAR-based perception with a proven track record in top-tier conferences (ICRA, IROS, WACV). Secured a €100,000 research grant from the German Federal Ministry of Education and Research (BMBF).

## Education

**Computer Science, Ph.D.,** *Technical University of Darmstadt, Telecooperation Lab.* 02/2022 – today

- Research Focus: Machine learning for human-centric urban scene understanding and LiDAR-based perception
- Secured €100,000 research grant (Software Campus, BMBF)

**Computer Science, M.Sc. (1,57),** *Technical University of Darmstadt, Computer Science Department.* 2019 – 2021

- Master's Thesis: Driving Event Discovery based on Vehicle CAN-data (Grade 1.0)
- Major: Machine Learning, IT Security, Secondary field of study: Human Sciences

**Computer Science, B.Sc. (2,12),** *Technical University of Darmstadt, Computer Science Department.* 2013 – 2019

- Bachelor's Thesis: Towards Enforcing Dynamic Security Policies in Java Programs (Grade 1.0)

## Selected Peer-Reviewed Academic Publications

**DeSPITE: Exploring Contrastive Deep Skeleton-Pointcloud-IMU-Text Embeddings for Advanced Point Cloud Human Activity Understanding,** *Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea, [IN SUBMISSION]*. ICCV 2025

**Whenever, Wherever: Towards Orchestrating Crowd Simulations with Spatio-Temporal Spawn Dynamics,** *Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea.* ICRA 2025

**LiOn-XA: Unsupervised Domain Adaptation via LiDAR-Only Cross-Modal Adversarial Training,** *Thomas Kreutz, Jens Lemke, Max Mühlhäuser, Alejandro Sanchez Guinea, [Oral]*. IROS 2024

**Unsupervised 4D LiDAR Moving Object Segmentation in Stationary Settings with Multi-variate Occupancy Time Series,** *Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea.* WACV 2023

**Unsupervised Driving Event Discovery Based on Vehicle CAN-data,** *Thomas Kreutz, Ousama Esbel, Max Mühlhäuser, Alejandro Sanchez Guinea.* ITSC 2022

## Research & Work Experience

**Research Associate/PhD Student,** *Telecooperation Lab, Technical University of Darmstadt.* 02/2022 – ?

- Proposed new unsupervised ML approaches for LiDAR motion segmentation and domain adaptation for LiDAR semantic segmentation (WACV 2023, IROS 2024)
- Proposed a novel approach for spatio-temporal spawn dynamics for crowd simulations using neural temporal point processes (nTPP-GMM) (ICRA 2025)
- Proposed a new multi-modal contrastive learning approach (DeSPITE) integrating LiDAR, IMU, skeleton and text for human activity understanding tasks such as person-reidentification, cross-modal retrieval, and human activity recognition (ICCV 2025)

**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.
- Anomaly detection in diagnostic trouble codes for the charging mechanism of an electric vehicle.

**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.
- Collection and annotation of vehicle CAN-data of a Tesla Model 3 vehicle.

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

**05/2019 – 06/2020**

- Implementation of a virtual network and 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.

## Grants

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

**04/2023 – 04/2025**

- €100,000 research grant
- Led my own research project, "Unsupervised Object and Behavior Recognition with LiDAR and Time Series Data."
- Led a multi-modal data collection initiative (LiDAR, IMU, video) to develop self-supervised object recognition systems, using 2x LiDAR Velodyne VLP16 + 1xGoPro Hero 8 + 10xMovella Xsens Dot IMU
- Completed six intensive 1-2 day training sessions focused on leadership and personal competencies at Zeiss, Merck, Trumpf, Volkswagen, Huawei, and DATEV.

## Technical Skills & Competences

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

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

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

**Machine Learning Skills:** Spatio-Temporal Modeling, Deep Generative Models, Self-supervised Representation Learning, Disentangled Representation Learning, Multi-Modal Representation Learning, Multi-Modal Contrastive Learning, Unsupervised Domain Adaptation, LiDAR Semantic Segmentation, LiDAR Motion Segmentation, Clustering, Crowd Simulation, Imitation Learning, Human Activity Recognition, Cross-Modal Retrieval

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

## Teaching & Mentorship

**Teaching Assistant**, Internet Practical Course Telecooperation.

**10/2023 – 02/2024**

Supervising Android app development projects on the topic of remote collaboration. (12 groups with 4-6 members each)

**Academic Supervision.**

**02/2022 – present**

Supervised 6 x Master's and 3 x Bachelor's Theses

## Conference Reviewing

**Conference:** IEEE International Conference on Robotics and Automation 2025 (ICRA 2025)

**Conference:** IEEE/RSJ International Conference on Intelligent Robots and Systems 2024 (IROS 2024)

**Conference:** IEEE/CVF Conference on Computer Vision and Pattern Recognition 2024 (CVPR 2024)

**Conference:** The 34th IEEE Intelligent Vehicles Symposium (IV 2022)