Thomas Kreutz, M.Sc.

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Google Scholar Profile

Professional Summary

Ph.D. candidate at TU Darmstadt specializing in LiDAR-based urban scene understanding and multi-modal representation learning, 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). Passionate about developing novel ML concepts for important real-world problems, such as crowd simulation, human activity recognition, person re-identification, semantic segmentation, object detection, and media retrieval.

Education

Computer Science, Ph.D., *Technical University of Darmstadt*, Telecooperation Lab.   **02/2022 – today**
○ Research Focus: Machine learning for urban scene understanding with 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, [In Submission].   **ICCV 2025**
Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea

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

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

Unsupervised 4D LiDAR Moving Object Segmentation in Stationary Settings with Multivariate Occupancy Time Series, [Presentation].   **WACV 2023**
Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea
IEEE/CVF Winter Conference on Applications of Computer Vision 2023

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

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

o Deep learning-based anomaly detection on the measurement time series data of a high-voltage battery for electric vehicles.
o 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:

o Development of an unsupervised machine learning approach to discover driving events in vehicle CAN-data from a Tesla Model 3 vehicle without any supervision.
o Collection and annotation of vehicle CAN-data of a Tesla Model 3 vehicle.

Student Research Assistant, *MAIS*, Technical Unversity of Darmstadt.   **05/2019 – 06/2020**

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

Grants

Software Campus Program, *German Federal Ministry of Education and Research (BMBF)*.   **04/2023 – 04/2025**

o €100,000 research grant
o Led my own research project, "Unsupervised Object and Behavior Recognition with LiDAR and Time Series Data."
o 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
o 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

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

Research Topics: LiDAR, Multivariate Time Series Data, 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

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)*