Thomas Kreutz, M.Sc.

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Google Scholar Profile

∗ PROFESSIONAL SUMMARY

Ph.D. Candidate in Computer Science with expertise in unsupervised machine learning, urban scene understanding, and controllable data generation. Experienced with LiDAR and multivariate time series data and a strong publication record in various top-tier machine learning conferences. Obtained a 100,000€ research grant in the first year of my PhD from the Federal Ministry of Education and Research (BMBF) as part of the Software Campus program.

EDUCATION

Computer Science, Ph.D., *Technical University of Darmstadt*, Telecooperation Lab. **02/2022 – ?**
○ Research Focus: Unsupervised ML for urban scene understanding and controllable data generation

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)

PEER-REVIEWED ACADEMIC PUBLICATIONS

LiOn-XA: Unsupervised Domain Adaptation via LiDAR-Only Cross-Modal Adversarial Training. **IROS 2024**

Thomas Kreutz, Jens Lemke, Max Mühlhäuser, Alejandro Sanchez Guinea
IEEE/RSJ International Conference on Intelligent Robots and Systems 2024
[Oral presentation]

Common Sense Initialization of Mixture Density Networks for Motion Planning with Overestimated Number of Components. **ICLR 2024**

Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea
The Second Tiny Papers Track at ICLR 2024
[Invite to present]

Unsupervised 4D LiDAR Moving Object Segmentation in Stationary Settings with Multivariate Occupancy Time Series. **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. **ITSC 2022**

Thomas Kreutz, Ousama Esbel, Max Mühlhäuser, Alejandro Sanchez Guinea
IEEE International Conference on Intelligent Transportation Systems 2022

NON-ARCHIVAL PEER-REVIEWED ACADEMIC PUBLICATIONS

Implicit Neural Clustering. **CVPR 2024**

Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea
Synthetic Data for Computer Vision Workshop@ CVPR 2024

ACADEMIC PUBLICATIONS IN SUBMISSION

The Sky Is The Limit When Clustering Is Equated With Disentenglement. **ICLR 2025**

Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea
(in submission)

Whenever, Wherever: Towards Orchestrating Crowd Simulations with Spatio-Temporal Spawn Dynamics. **ICRA 2025**

Thomas Kreutz, Max Mühlhäuser, Alejandro Sanchez Guinea
(in submission)

PROFESSIONAL EXPERIENCE

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

With a focus on urban environments, my PhD research focuses on advancing unsupervised learning methods for scene understanding and controllable data generation. My work mainly involves motion and semantic segmentation, unsupervised domain adaptation, crowd simulation, and controllable data synthesis, where I develop approaches that allow to interpret and simulate dynamic urban scenes without the need for annotated data. At the moment I am working on dense-correspondences between LiDAR and IMU data.

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, *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**

Research and implementation of measures against a DDoS attack on the Floodlight SDN Controller with the help of Dynamic Enforcement

o Implementation of a virtual network and DDoS attack 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.

PROFESSIONAL DEVELOPMENT

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

o Grant Amount: €100,000

o Project Title: UnErObVe: Unsupervised Object and Behavior Recognition with LiDAR and Time Series Data

o Research Partner: Technical University of Darmstadt

o Industry Partner: Software AG

o Program Overview: The Software Campus is a competitive qualification program aimed at equipping computer science students and graduates with essential leadership skills and competencies necessary for leadership positions and situations in research or industry.

o Key research project responsibilities:

  - Planning and supervising the multi-modal data collection (2xVelodyne VLP16 + 1xGoPro Hero 8 + 10xMovella Xsens Dot IMU) for the development of unsupervised human activity and object recognition systems.

  - Planning and supervising the development of approaches for unsupervised human activity and object recognition systems.

  - Planning and supervising the design and creation of prototype system combining the project outcomes.

o Leadership Training: Completed six intensive 1-2 day training sessions focused on leadership, methodologies, and personal competencies at leading companies, including Zeiss, Merck, Trumpf, Volkswagen, Huawei, and DATEV.

TEACHING & MENTORING EXPERIENCE

Teaching Assistant.   **10/2023 – 02/2024**

Internet Practical Course Telecooperation

Supervision of Android app development projects on the topic of remote collaboration. (4-6 members per group, 12 groups in total)

Bachelor's and Master's Thesis Supervision.   **02/2022 – present**

Direct supervision of Bachelor's and Master's undergraduate students in their final year thesis by, e.g., regular recurring meetings, guidance, the teaching of a systematic literature review methodology, research skills, and academic writing skills.

- Supervised 3x Bachelor's and 6x Master's theses.

REVIEWER EXPERIENCE

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)*

SKILLS & INTERESTS

Programming Languages: Python, C#, Java

ML Tools and Libraries: Pytorch, Tensorflow, Scikit-Learn, Numpy, Pandas, Pyplot, Seaborn

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

Research: LiDAR, Multivariate Time Series Data, Spatio-Temporal Modeling, Deep Generative Models, Self-supervised Representation Learning, Disentangled Representation Learning, Object-centric Learning, (Unsupervised) Domain Adaptation, (LiDAR) Object Detection, (LiDAR) Semantic Segmentation, (LiDAR) Panoptic Segmentation, (LiDAR) Motion Segmentation, Clustering, Trajectory Prediction (uni or multi-modal, short- and longterm), Crowd Simulation, Imitation Learning, (Neural) Cellular Automata