

DENIZHAN KARA

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Machine Learning Engineer at Waymo and Ph.D. in Computer Science from the University of Illinois Urbana-Champaign. Research interests include multimodal and time-series foundation models, robust and data-efficient representation learning, domain-aware learning, and autonomous systems.

EDUCATION

University of Illinois Urbana-Champaign Champaign, IL
Ph.D. in Computer Science, Siebel School of Computing and Data Science May 2026

University of Illinois Urbana-Champaign Champaign, IL
M.S. in Computer Science Dec. 2021

Koç University Istanbul, Turkey
B.Sc. in Electrical and Electronics Engineering & Physics, Double Major Jun. 2017

PROFESSIONAL EXPERIENCE

Waymo Mountain View, CA
Machine Learning Engineer, Driver Understanding ML Jun. 2026 – Present

- Develop specialized Gemini-based models for road-rule compliance and rare/long-tail traffic-event understanding using post-training techniques, including supervised fine-tuning (SFT). Work end to end across training-data creation, model-training experiments, and evaluation.
- Contribute to agentic reasoning harnesses that answer complex, multi-stage questions about traffic events.

Waymo Mountain View, CA
Software Engineer Intern, Driver Understanding ML May 2025 – Aug. 2025

- Architected and deployed a Gemini LLM automation framework for traffic-event triage, achieving 91% recall on high-impact scenarios across millions of daily autonomous-vehicle events.
- Built a production few-shot inference pipeline that improved complex-judgment recall by 9 percentage points and supported diverse event classes.
- Authored prompt-engineering and automation practices adopted across three teams, with up to 90% recall reported on a related automation task.

U.S. Army DEVCOM Research Laboratory Adelphi, MD
Research Scientist Intern, Multimodal Foundation Models R&D Jun. 2024 – Sep. 2024

- Developed sub-10M-parameter multimodal foundation models for vehicle classification, improving accuracy by 12% with real-time edge deployment.
- Integrated physical decay models into pretraining objectives, improving robustness to environmental variation by 10% on low-cost edge devices.
- Optimized heterogeneous model-training workflows, improving training speed by 30%, and deployed sub-second inference for distributed sensing.

Prometeia Istanbul, Turkey
Senior Consultant, Machine Learning Engineer Jan. 2020 – Aug. 2022

- Architected a propensity-scoring framework over 3M+ transactions using temporal embeddings and attention for customer-interest prediction.
- Developed a deep-learning credit-default system with temporal transaction features, improving recall by 25%.
- Improved an automated vehicle-damage segmentation system by 6% F1 through model and augmentation-pipeline enhancements.

Turkish Aerospace Ankara, Turkey
Software Design Engineer, Autopilot Systems Jul. 2017 – Dec. 2019

- Developed signal-processing libraries for autopilot control software, reducing processing delay by up to 20%.
- Built filtering solutions for electromagnetic and vibration noise and a sensor-emulator framework for software-in-the-loop testing.

RESEARCH EXPERIENCE

University of Illinois Urbana-Champaign

Graduate Researcher, Multimodal and Time-Series Foundation Models

Champaign, IL

Aug. 2022 – May 2026

- Led research on robust, data-efficient representation learning for heterogeneous time-series and multimodal sensing under label scarcity and distribution shift.
- Developed AdaTS, a physics-guided adaptive contrastive-learning module that improved accuracy by up to 13.7% across diverse datasets and three contrastive frameworks.
- Developed first-author masked-modeling methods FreqMAE and PhyMask for frequency-aware multimodal fusion and adaptive masking, published at The Web Conference and ACM SenSys.

University of Illinois Urbana-Champaign

Graduate Researcher, Adversarial ML and Autonomous-System Security

Champaign, IL

Aug. 2020 – May 2022

- Designed OVERTON, a temporal anomaly-detection and trust framework for adversarial behavior in vehicle-to-everything networks.
- Developed sensor-spoofing methods for studying and improving the resilience of UAV control systems.

SELECTED PUBLICATIONS

2026

- [1] **Kara, D.**, et al. *REMIX: Adaptive Open-Domain Signal Mixing for Efficient Sensing Data Augmentation*. ICCCN 2026.
- [2] Kimura, T., **Kara, D.**, et al. *Dywave: Event-Aligned Dynamic Tokenization for Heterogeneous IoT Sensing Signals*. ICML 2026.

2025

- [3] **Kara, D.**, et al. *AdaTS: Learning Adaptive Time Series Representations via Dynamic Soft Contrasts*. NeurIPS 2025.
- [4] **Kara, D.**, et al. *DiffPhys: Differential Physics Augmentations for Enhanced Representations*. ICCCN 2025.
- [5] Kimura, T., et al. *InfoMAE: Pairing-Efficient Cross-Modal Alignment with Informational Masked Autoencoders for IoT Signals*. The Web Conference 2025.

2024

- [6] **Kara, D.**, et al. *FreqMAE: Frequency-Aware Masked Autoencoder for Multi-Modal IoT Sensing*. The Web Conference 2024.
- [7] **Kara, D.**, et al. *PhyMask: An Adaptive Masking Paradigm for Efficient Self-Supervised Learning in IoT*. ACM SenSys 2024.

Full publication list: [Google Scholar](#).

SELECTED PRESENTATIONS

- [1] **Kara, D.**, Bhattacharyya, J., Goldman, G., and Abdelzaher, T. *Integrating Physical Principles with Self-Supervised Learning for Robust Vehicle Classification in Diverse Environments*. AGU Fall Meeting, 2024.
- [2] **Kara, D.**, Bhattacharyya, J., and Abdelzaher, T. *A Novel Physics-Guided Contrastive Learning Strategy for Seismic Signal Analysis*. Military Sensing Symposium, 2025.

TECHNICAL SKILLS

Research: Foundation models, multimodal learning, time-series representation learning, self-supervised learning, robustness, domain-aware learning

ML: PyTorch, TensorFlow, JAX, Hugging Face Transformers, CUDA

Engineering: Python, C++, MATLAB, distributed training, model evaluation and deployment, AWS/GCP, Docker, Spark