Cem Okan Yaldiz

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Education

Georgia Institute of Technology • Atlanta/GA   August 2021
PhD in Robotics • *Electrical and Computer Engineering* • CGPA: 4.0/4.0 • Expected Spring 2026
Master of Science • *Computer Science* • *Computational Perception and Robotics* • December 2024
Advisor: Omer Inan
Interest: Applied Machine/Deep Learning, Time Series, Sensors, Computer Vision, Reinforcement Learning

Bilkent University • Turkey   August 2016 – June 2021
Bachelor of Science • *Electrical and Electronics Engineering* • *CGPA: 3.94/4.0*

Experience

Summer Associate - Quantitative Strategist – Credit Risk   Summer 2025
Goldman Sachs, Dallas

- Designed and validated a proof-of-concept mathematical model to evaluate credit risk for structured finance products backed by commercial real estate.

- Explored the use of various time series models for scenario generation and conducted quantitative risk analysis.

Graduate Research Assistant – Inan Research Lab   August 2021 – Present
Georgia Institute of Technology, Atlanta

- **Physiological Foundation Models**

  - Developing a multi-modal physiological latent space extractor with self-supervised learning using approaches such as vision transformer–based masked autoencoding and cross-modal transformers.

  - Using electroencephalogram (EEG) and wearable-based cardiac signals such as electrocardiogram (ECG), seismocardiogram (SCG) and photoplethysmogram (PPG).

- **Efficient Physiological Signal Denoising with Diffusion Models**

  - Improving the memory footprint and computational efficiency of an existing seismocardiogram denoising diffusion model through techniques such as pruning, quantization, and model distillation.

- **Representation Learning From Unstructured Real World Time Series Data**

  - Devised a method to predict exertional heat stroke in soldiers during rucksack marches.

  - Developed an LSTM-based autoencoder model to extract latent space from physiological strain-stress trajectories and combined it with isolation forests.

  - Analyzed approximately 3 hours of unstructured wearable data per soldier from 478 soldiers in real military environments.

  - Achieved prediction capability of **52± 18 minutes in advance** with 1.0 sensitivity and 0.99 AUC.

- **Time Series Forecasting for Cardiac Event Timing Prediction**

  - Developed time-invariant/time-varying and unimodal/multimodal Kalman filter-based models for real-time forecasting of cardiac event timings (e.g., R-peak, aortic opening, and closing).

  - Evaluated and compared various models (Gaussian processes, ARIMA, Kalman filter-based ARMA, CNN, LSTM, ConvLSTM) under various scenarios to assess robustness, computational efficiency, and accuracy.

  - Time-varying multimodal Kalman filter models achieved prediction errors of **1.73 ms** for R-peak, **2.64 ms** for aortic opening, and **9.44 ms** for aortic closing.

- **Reducing Post-Deployment Distribution Shift**

  - Developed a reliable calibration approach for magnetic localization, mapping measurements from 9DoF IMU to 3D coordinate space to achieve *sub-millimeter* accuracy for IMU-based tongue tracking.

  - Extracted and applied a transformation between post-deployment and pre-deployment measurement data spaces, and Significantly reduced **(up to 7x)** the degree of post-deployment distribution shift.

Undergraduate Research Assistant – Systems Lab   February 2019 – August 2021
Bilkent University, Ankara

- **Game Theoretical Behavioral Human Driver Modeling**
  - Developed continuous behavioral human driver models by refining game theoretical model.
  - Employed reinforcement learning (e.g., DQN) to derive discrete level-k human driver policies, and extended them to continuous level-k policies using Gaussian processes.
  - Achieved **73% success** in modeling human driver behaviors, approximately **40% more accurate** than discrete-level models.

PUBLICATIONS

- A.R. Emirdagi et al., "EffSCG: An Efficient Framework for Real-Time Seismocardiogram Denoising on Resource-Constrained Edge Devices", Manuscript under preparation (2025).
- D. Tangolar et al., "Establishing Generalizability of Wearable-Enabled Blood Volume Decompensation Status Estimation Algorithms Using Transfer Learning", Under review (2025).
- M. Cho et al., "Seismocardiography Pig Hypovolemia Dataset for Signal Quality Indexing and Validated Cardiac Timings ", Under review (2025).
- **C.O. Yaldiz** et al., "Short-Term Physiological Forecasting with Adaptive Covariance Matrix Estimation", *IEEE-EMBS BSN*, 2025.
- **(Best Paper Award)** D. Tangolar et al., "Enabling Intelligent Resuscitation: Non-Invasive Cardiac Output Monitoring via Physiological Sensing and Machine Learning", *IEEE-EMBS BSN*, 2025.
- **C.O. Yaldiz** et al., "Real-Time Autoregressive Forecast of Cardiac Features for Psychophysiological Applications", special issue of *IEEE Journal of Biomedical and Health Informatics*, 2025.
- S.Karimi et al., "Prescreening Depression Using Wearable Electrocardiogram and Photoplethysmogram Data from a Psycholinguistic Experiment", *Physiological Measurement*, 2025.
- O.S. Kilic et al., "Heart rate informed detection of cardiac events using the Kalman filter", *Computers in Biology and Medicine*, 2025.
- **C.O. Yaldiz** et al., "Early prediction of impending exertional heat stroke with wearable multimodal sensing and anomaly detection", *IEEE Journal of Biomedical and Health Informatics*, 2023.
- **C.O. Yaldiz** et al., "Improving Reliability of Magnetic Localization Using Input Space Transformation", *IEEE Sensors Journal*, 2023.
- **C.O. Yaldiz**, Y. Yildiz, "Driver Modeling Using a Continuous Policy Space: Theory and Traffic Data Validation", *IEEE Transactions on Intelligent Vehicles*, 2023.
- D.J. Lin et al., "Predicting Soldier Performance on Structured Military Training Marches with Wearable Accelerometer and Physiological Data", *IEEE Sensors Journal*, 2023.
- **C.O. Yaldiz**, Y. Yildiz, "Driver Modeling Using Continuous Reasoning Levels: A Game Theoretical Approach," *2022 IEEE 61st Conference on Decision and Control (CDC)*, Cancun, Mexico, 2022, pp. 5068-5073.

SKILLS

- **Technical**: Machine Learning, Deep Learning, Data Science, Time Series, Anomaly Detection, Computer Vision, Reinforcement Learning, Natural Language Processing, Generative Modeling, Biosensors, Physiological Computing, Motion Tracking, Human Activity Recognition, Multi-Modal Fusion, State Space Modeling, Signal Processing
- **Programming**: Python, MATLAB, C++, Pytorch, Pytorch Lightning, Wandb
- **Tools**: Microsoft Office, Inkscape, LaTeX, Git

HONORS & AWARDS

- **Georgia Institute of Technology ECE Fellowship (2022)**: Received a stipend for the first year of study.
- **Bilkent University EEE Graduation Awards (2021)**: Granted for academic excellence.
- **TUBITAK Star Undergraduate Research Award (2021)**: Received monthly stipend during a research project on the subject of behavioral human driver modeling.
- **Turkish Education Foundation (TEV) Outstanding Success Scholarship (2017-2021)**: Granted a scholarship for leadership skills during undergraduate education.
- **Bilkent University Comprehensive Scholarship (2016-2021)**: Granted a full tuition waiver and stipend for achieving a high rank in the nationwide university entrance exam during the B.Sc. program.