

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, Data-Driven Decision-Making, Sensors

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 Latent Space Extraction**
 - Developing a multi-modal latent space extractor using a self-supervised learning.
 - Using electroencephalogram (EEG) and wearable-based cardiac signals such as electrocardiogram (ECG), seismocardiogram (SCG) and photoplethysmogram (PPG).
- **Automated SCG Annotation**
 - Exploring an LLM-based automatic annotator to extract text representations from SCG waveforms and perform signal annotation based on the generated text.
- **Automated SCG Signal Quality Indexing**
 - Leading efforts for developing time series representation learning techniques (e.g., self-supervised learning, contrastive learning) to assess and quantify the quality of SCG signals.
- **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.
 - Utilized heart rate data to quantify physiological strain and accelerometry measurements to estimate metabolic energy, representing physiological stress.
 - 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. Published in IEEE JBHI (2023).
- **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 noise conditions and 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. Published in IEEE JBHI (2025).

- **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 linear transformation between post-deployment measurement data space and pre-deployment training data space, improving model accuracy.
- Significantly reduced (**up to 7x**) the degree of post-deployment distribution shift. Published in IEEE Sensors Journal (2023).

Undergraduate Research Assistant – Systems Lab
Bilkent University, Ankara

February 2019 – August 2021

- **Game Theoretical Behavioral Human Driver Modeling**

- Developed continuous behavioral human driver models by refining the level-k reasoning concept from game theory.
- 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. Published in CDC (2022) and IEEE Transactions on Intelligent Vehicles (2023).

PUBLICATIONS

- **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.
- D. Tangolar et al., “Leveraging Non-Wearable Data to Improve Wearable Blood Volume Decomposition Estimation”. Under preparation (2025).
- S.Karimi et al., “Prescreening Depression Using Wearable Electrocardiogram and Photoplethysmogram Data from a Psycholinguistic Experiment”, *Physiological Measurement*. Accepted for publication (2025).
- O.S. Kilic, A. Nawar, **C.O. Yaldiz**, F. Rahman, C. Chen, A. Shah, O.T. Inan, “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.

SERVICE

- **Reviewer:** IEEE Journal of Biomedical and Health Informatics - 2024
- **Reviewer:** IEEE Conference on Decision and Control - 2024

SKILLS

- **Technical:** Machine Learning, Deep Learning, Data Science, Time Series Analysis/Forecasting, Anomaly Detection, Computer Vision, Reinforcement Learning, Natural Language Processing, Biosensors, Physiological Computing, Motion Tracking, Human Activity Recognition, Multi-Modal Fusion, State Space Modeling, Signal Processing
- **Programming:** Python, MATLAB, C++, Pytorch, Pytorch Lightning, Hugging Face, Wandb
- **Tools:** Microsoft Office, Inkscape, L^AT_EX, 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.