EMRE KURTOĞLU

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Summary

ML researcher with background focused on signal processing, computer vision and fundamental ML/DL research. Have 6+ years of experience with end-to-end ML/DL including experiment design, real-world dataset curation, preprocessing, DL model design and training, evaluation and deployment. Also worked with signal processing and ML/DL applications of various sensors including FMCW radars, RGB-D/IR cameras, ECG and iEEG.

Website: https://ekurtgl.github.io/

Education

Ph.D. in Electrical and Computer Eng., The University of Alabama*, Tuscaloosa, AL, USA (2019 – 2024)*
B.Sc. in Electrical and Electronics Eng., Koc University, *Istanbul, Turkey (2018)*

Work Experience

July 2024 - Present **The Rockefeller University ~ New York, NY, USA**
Machine Learning Engineer II (Data Science Platform [Link])
Active Projects:
- Self-supervised learning for neuron tracking from extracellular neural recordings *in vivo* with chronically implanted multi-electrode arrays [Link].
- Contactless respiration and heart beat monitoring using radar [Link].
- Multi-camera data acquisition with Basler and FLIR cameras [Link].

May 2023 – Aug 2023 **NXP ~ San Jose, CA, USA**
Machine Learning Intern
- Neural Architecture Search (NAS) on radar point cloud classification model.
- Automotive sensor (Radar & Camera) data visualization via AVS.
- Mentor: Satish Ravindran, Manager: Ryan Wu.

May 2021 - Aug 2021 **Google Summer of Code (GSoC), Machine Learning for Science (ML4SCI)**
Machine Learning Intern
- Graph Neural Networks for Particle Momentum Estimation in the CMS Trigger System [Article, Code]
- Mentor: Dr. Sergei Gleyzer

Jun 2018 – July 2018 **Aselsan ~ Ankara, Turkey**
Military Computer Design Engineering Intern
- Worked on embedded systems programming with the peripherals of PIC32MX such as ADC, Timer, Oscillator, UART, I2C and Flash, in C.
- Mentor: Fatih Say

Feb 2018 – Mar 2018 **Acrome Robotics ~ Istanbul, Turkey**
Production Intern (Volunteer – Part-time)
- Assembled robotics' parts (e.g. Delta Robot, Ball Balancing Table) which are used in lab lectures and calibrated the final products.

Aug 2017 – Sep 2017 **Honeywell ~ Istanbul, Turkey**
Process Solutions Intern
- Designed operator panels of distributed control systems.

Research Experience

2019 – 2024 **Graduate Research Assistant | Computational Intelligence for Radar Lab**

- **RF Sensing for Sign Language Driven Smart Environment**
  - Experiment design and raw data acquisition with multiple FMCW MIMO radars (TI's IWR1443, AWR1642, AWR2243 single and cascade chips, Infineon's BGT60TR13C, XeThru X4) and RGB-D sensors including (Kinect v2, Orbbec, Basler, FLIR).
  - Graphical User Interface (GUI) design for simultaneous data acquisition from multiple sensors (radar, lidar, camera, Kinect). [Code]
  - FMCW MIMO radar simulation for point targets. [Code (250+ GitHub stars)]
  - Multi-modal fusion network design for video and RF data classification.
  - Extraction of range, Doppler and angle information from raw I/Q RF data and point cloud generation.
  - Real-time processing and classification of RF data.
  - Automated temporal segmentation and sequential classification of RF data. [Paper]
  - Multi-input multi-task learning network design for multiple data representations. [Paper]
  - Researched deep neural network design for ASL recognition with radar.
  - Researched Graph Neural Network (GNN) design for RF data.
  - Body and hand skeleton extraction and registration of them using RGB-D sensors.
  - Developed sign language-controlled Chess game with synchronous multi-modal (Video + RF) data acquisition and prediction. [Paper]
  - Developed a contactless vital sign monitoring system with radar for macaques. [Project]

Social

- Google Scholar: https://scholar.google.com/citations?hl=en&authuser=3&user=CRJwW9oAAAAJ
- GitHub: https://github.com/ekurtgl
- LinkedIn: https://www.linkedin.com/in/emrekurtoglu96/?locale=en_US

Publications

Journals:

- SZ. Gurbuz, AC. Gurbuz, EA. Malaia, DJ. Griffin, C. Crawford, E. Kurtoglu, et al., **"American Sign Language Recognition Using RF Sensing,"** in *IEEE Sensors Journal*, doi: 10.1109/JSEN.2020.3022376.
- SZ. Gurbuz, MM. Rahman, E. Kurtoglu, et al., **"Multi-Frequency RF Sensor Fusion for Word-Level Fluent ASL Recognition,"** in *IEEE Sensors Journal*, doi: 10.1109/JSEN.2021.3078339.
- Emre Kurtoglu, AC. Gurbuz, Evie Malaia, Darrin Griffin, Chris Crawford, and Sevgi Z. Gurbuz, **"ASL Trigger Recognition in Mixed Activity/Signing Sequences for RF Sensor-Based User Interfaces,"** in *IEEE Transactions on Human-Machine Systems, 2021*.
- Sevgi Z. Gurbuz, Emre Kurtoglu, M. Mahbubur Rahman, Dario Martelli, **"Gait variability analysis using continuous RF data streams of human activity"** in *Smart Health, Volume 26, 2022*.
- Evie A. Malaia, Joshua D. Borneman, Emre Kurtoglu, Sevgi Z. Gurbuz, Darrin Griffin, Chris Crawford, and Ali C. Gurbuz. **"Complexity in sign languages"**. Linguistics Vanguard, 9(s1):121–131, 2023.
- Emre Kurtoglu, Sabyasachi Biswas, AC. Gurbuz and Sevgi Z. Gurbuz, **"Boosting multi‐target recognition performance with multi‐input multi‐output radar‐based angular subspace projection and multi‐view deep neural network"** in *IET Radar, Sonar & Navigation, 2023*.
- Emre Kurtoglu, Kenneth DeHaan, Caroline Kobek Pezzarossi, Darrin J. Griffin, Chris Crawford, and Sevgi Z. Gurbuz, **"Interactive Learning of Natural Sign Language with Radar"** in *IET Radar, Sonar & Navigation, 2024*.
- Emre Kurtoğlu and Sevgi Z. Gurbuz, **"Human-Centered Fully-Adaptive Radar for Gesture Recognition in Smart Environments,"** in *IEEE Transactions on Human-Machine Systems, 2025*. (Accepted)

Conference Proceedings:

- SZ. Gurbuz, AC. Gurbuz, EA. Malaia, DJ. Griffin, C. Crawford, E. Kurtoglu, et.al. **"A Linguistic Perspective on Radar Micro-Doppler Analysis of American Sign Language"**, *IEEE Radar Conference, 2020*.
- SZ. Gurbuz, MM. Rahman, TF. Macks, E. Kurtoglu, **"Cross Frequency Training with Adversarial Learning for Radar micro-Doppler Signature Classification"**, in *Proc. SPIE, Defense + Commercial Sensing Symposium*.
- SZ. Gurbuz, AC. Gurbuz, EA. Malaia, DJ. Griffin, C. Crawford, E. Kurtoglu, et al., **"ASL Recognition Based on Kinematics Derived from a Multi-Frequency RF Sensor Network"**, in *IEEE Sensors Conference, 2021*.
- E. Kurtoglu, AC. Gurbuz, EA. Malaia, DJ. Griffin, C. Crawford, SZ. Gurbuz, **"Sequential Classification of ASL Signs in the Context of Daily Living Using RF Sensing"**, in *IEEE Radar Conference, 2021*.
- M. Mahbubur Rahman, E. Kurtoglu, R. Mdrafi, A.C. Gurbuz, E. Malaia, C. Crawford, D. Griffin, S.Z. Gurbuz, **"Word-level ASL Recognition and Trigger Sign Detection with RF Sensors"**, in *Proc. IEEE ICASSP, 2021*.
- Oladipupo O. Adeoluwa, Sean J. Kearney, Emre Kurtoglu, Charles J. Connors, and Sevgi Z. Gurbuz **"Near real-time ASL recognition using a millimeter wave radar"***, Proc. SPIE 11742, Radar Sensor Technology XXV*, *1174218 (26 April 2021)*.
- M. M. Rahman, E. Kurtoglu et al., **"Performance Comparison of Radar and Video for American Sign Language Recognition,"** in *IEEE Radar Conference (RadarConf22), 2022*, pp. 1-6.
- S. Z. Gurbuz, E. Kurtoglu et al., **"ASL Recognition Based on Kinematics Derived from a Multi-Frequency RF Sensor Network,"** in *IEEE SENSORS, 2020*, pp. 1-4, doi: 10.1109/SENSORS47125.2020.9278864.
- E. Kurtoğlu, et al., **"RF Micro-Doppler Classification with Multiple Spectrograms from Angular Subspace Projections,"** in *IEEE Radar Conference (RadarConf22), 2022*, pp. 1-6. **(*Best student paper finalist - alternate*)**
- Emin Ucer, E. Kurtoglu, et al., **"Local detection of oltc operation to support decentralized control of active end-nodes"**. In 2022 IEEE Power & Energy Society General Meeting (PESGM), pages 1–5, 2022.
- Sevgi Z. Gurbuz, M. Mahbubur Rahman, E. Kurtoglu, and Dario Martelli. **"Continuous human activity recognition and step-time variability analysis with FMCW radar"**. In 2022 IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI), pages 01–04, 2022.
- Sevgi Z. Gurbuz, Emre Kurtoglu, et al., **"Interactive rf game design for deciphering real-world human motion: Activities, gestures, and sign language"**. In 2023 IEEE Radar Conference (RadarConf23), pages 1–6, 2023.
- Emre Kurtoğlu, Sultanus Salehin, Moeness G. Amin, Sevgi Z. Gurbuz, **"RF sensing of personalized mobility: accounting for temporal variability in ethogram-based classification,"** Proc. SPIE 13048, Radar Sensor Technology XXVIII, 130480Q (2024).
- E. Kurtoğlu, M. G. Amin and S. Z. Gurbuz, **"Radar Based Joint Human Activity and Agility Recognition via Multi Input Multi-Task Learning,"** 2024 IEEE Radar Conference (RadarConf24), Denver, CO, USA, 2024, pp. 1-6. (Runner Up Award)
- Emre Kurtoğlu, et al. **"Ethogram-Based Personalization of Human Activity and Agility from Radar µD Signatures."** 2024 IEEE EMBS International Conference on Biomedical and Health Informatics (BHI) (2024).
- Sevgi Z Gurbuz and Emre Kurtoğlu, **"Gesture-based Human-in-the-Loop Interaction with Fully-Adaptive Radar,"** IEEE International Radar Conference (RADAR), 2025, pp. 1-6.
- Kenneth DeHaan, Emre Kurtoğlu et al., **"RF-ChessSIGN: Radar-enabled Human-Computer Interaction in a \\ Real-Time Sign Language-Controlled Game,"** International Conference on Computer Vision (ICCV), 2025. (*Under Review*)

Honors & Awards

2024	Best Student Paper Competition Finalist (IEEE Radar Conf. 2024) – Denver, CO.
2022	Best Student Paper Competition Finalist-Alternate (IEEE Radar Conf. 2022) - New York, NY
2021 – 2022	UA Graduate Council Fellowship (Graduate School)
2014	National university entrance exam – full tuition scholarship for Gediz University

Technical Skills

- **Programming Skills:** MATLAB, Python (TensorFlow, PyTorch, LLM and database APIs, FastAPI)
- **Computing and Cloud:** Linux, CUDA, Cluster Computing, GCP, AWS (EC2, S3).

Invited Talks

2024	University College London (UCL) – Radar Group