ERKAN BAYRAM

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EDUCATION

University of Illinois at Urbana-Champaign Aug 2021 - Present
Ph.D. Candidate *in Electrical and Computer Engineering* *Urbana,IL*

· Studying under co-advisory of Prof. Tamer Başar and Assoc. Prof. M.-Ali Belabbas.

Bilkent University Aug 2016 - June 2021
B.S. in Electrical and Electronics Engineering (with Full Tuition Fee Scholarship, CGPA: 3.94/4.00) *Ankara,Turkey*

Aston University January 2020 - May 2020
Exchange Mobility in Electrical and Electronics Engineering *Birmingham,UK*

PROFESSIONAL EXPERIENCE

Analog Devices Inc. May 2024 - Agu 2024
Machine Learning Intern in Core AI Lab *Boston, MA*

· Developed **ultra-low latency** and low power neural networks for audio noise cancellation.
· Applied pruning and quantization to enhance inference speed and reduced model size **25 times**.
· Reduced FLOPs **x4** with respect to the SOTA to have power efficiency
· Utilized **AzureML** for model development and testing.
· Achieved **5.2dB** improvement compare to SOTA models under **10ms** latency.

Neurocess, Co. May 2021 - Dec 2023
Signal Processing Focus Data Science Consultant *Remote, London, UK*

· Developed probabilistic ML models for performance analysis of soccer players via **TensorFlow** and **PyTorch**.
· Developed a novel denoising model providing a significant **17dB** SNR improvement for motion artifact denoising on **sEMG** data.
· Automated report generation for weekly monitoring of athletes using generative models and LLM.
· Utilized **AWS** for ML model deployment and cloud computing.

University of Illinois Urbana-Champaign Jan 2024 - Present
Teaching Assistant *Urbana, IL*

· Teaching Assistant for MATH595/ECE553 Optimum Control Systems and ECE555 Control of Stochastic Systems

Coordinated Science Lab (UIUC) Aug 2021 - Present
Research Assistant at Decision and Control Group *Urbana, IL*

· Proficient in advanced control theory, optimizing system performance.
· Specializing in **sensor fusion** techniques for data integration.
· Control guarantee neural networks.
· Focused on distributed optimization algorithms for enhanced system efficiency.

Tübitak SAGE Jan 2021 - June 2021
Researcher (at Scientific and Technological Research Council of Turkey) *Ankara, Turkey*

· Worked at the Simulation and Mission Planning Software Division.
· Used **C++** and **.NET** to create the simulation environment for navigation algorithms for cruise missiles.

ASELSAN June - August 2020
Summer Intern in Systems Engineering *Ankara, Turkey*

· Worked on a nonlinear radar tracking problem and obtained **% 5.2** increase in filtering performance.
· Compared the performance of iterative and non-iterative Kalman Filters **(EKF, UKF, PLF)** in MATLAB.

Tübitak SAGE August - September 2019
Summer Intern in Simulation Engineering (at Scientific and Technological Research Council of Turkey) *Ankara, Turkey*

· Modeled sound behavior for a flight simulator in **MATLAB**, including simulations of physical characteristics e.g **Doppler effect**.

PUBLICATIONS AND PREPRINTS

Bayram E., Liu S., Belabbas M.-A., Başar T., *Control Theoretic Approach to Fine-Tuning and Transfer Learning*. (to be appeared on SysDO24)View on ArXiv

Bayram E., Baştopçu M., Belabbas M.-A., Başar T., *Age of k-out-of-n Systems a Gossip Network*. (to be appeared on Asilomar Conference 24')View on ArXiv

Bayram E., Belabbas M.-Ali, Başar T., *Vector-Valued Gossip over w-Holonomic Networks*. (Under review)View on ArXiv

Ergeneci M., **Bayram E.**, Carter D., Kosmas P., *A Novel Framework for Motion-Induced Artefact Cancellation in sEMG: Evaluation on EPL and Ninapro Datasets*. IEEE Sensors Journal, 24(15), 22610-22619.View on IEEEXplore

Ergeneci M., **Bayram E.**, Carter D., Kosmas P., *Attention-Enhanced Frequency-Split Convolution Block for sEMG Motion Classification: Experiments on Premier League and Ninapro Datasets*. IEEE Sensors Journal, 24(4), 4821-4830. View on IEEEXplore

Ergeneci M, **Bayram E.**. Carter D., Kosmas P., *sEMG Motion Classification Via Few-Shot Learning With Applications To Sports Science*. (prePrint)View on TechRxiv

PRESENTATIONS

Ergeneci M, **Bayram E.**, Carter D. *The Cooperation of Isometric Force Test and EMG for Hamstring Injury Prevention*. *Isokinetic Conference23*,London,2023.

Bayram E., Belabbas M-Ali. *Nontrivial Holonomy in Gossip Networks*. *CSL Student Conference*, Urbana, 2023.

PROJECTS

Detection and Denoising of Motion Artifact in sEMG: Experiments on Novel Artifact Model *2023 - 2024*

- Developed a novel metric combining spectral and temporal evaluations for sEMG denoising.
- Introduced a motion artifact model providing a significant **17dB** SNR improvement for denoising.
- Compared state-of-the-art noise cancellation techniques with VISA (**Variable Input Size Attention**).

Meta Learning for Rare Lower Extremity Motions to Detect Injury *2021-2022*

- Aimed to identify rare lower extremity motions using a novel feature extractor.
- Applied Metric-Based Meta-learning and Transfer Learning techniques.

Motion Classification with Temporal sEMG Signal *2021-2022*

- Improved over the existing state-of-the-art motion classifications models with an accuracy of **% 95** and **% 98** on Ninapro DB2 and DB1, respectively. The work is accepted for publication.
- Introduced a novel approach, COZDAL net, within **CBAM** and **Multi-Head Attention**.

Image Captioning on COCO Set *2020*

- Developed a NLP and computer vision model to caption images on the **COCO set**, providing **0.85 BLEU-2** score.
- Utilized transfer learning models such as **Inception v3** and **GloVe**.

Determination of Predominant Instrument *2020*

- Implemented spectrogram analysis with **Random Forest on C4.5** from scratch and providing **% 93** accuracy in classification.

UWB Based Multi-Robot Coordination View project video *2020-2021*

- Aimed to conduct swarm robotic operations in different formations for indoor applications via TDoA and AoA.
- Responsible for measurement noise filtering for **IMU** and **Tof Module**, the design of nonlinear controllers.

SERVICE

Technical Reviewer: IEEE ISIT, IEEE L-CSS, IEEE CDC, SysDO24'

HONORS & ACADEMIC ACHIEVEMENTS

- Academic Excellence Award, Bilkent University EEE Department. *2021*
- Social Awareness and Activity Award, Bilkent University EEE Department. *2021*
- Recipient of the Undergraduate Industrial Project Grant, 2209B Tübitak Grant for an R&D project. *2021*
- National Merit Scholarships - Stipend for successful precollege students in Turkey. *2009-2016*
- Ranked **252nd** among 2 million students in the National University Placement Exam (YGS-LYS) *2016*