Mert Albaba

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How can we make robots capable of autonomously acquiring and deploying new skills? I focus on developing multimodal imitation learning approaches that combine (inverse) reinforcement learning, large language models, and vision transformers.

Research Interests: Imitation Learning - Reinforcement Learning - Robotics & Autonomous Systems - Foundational Models

EDUCATION

ETH ZURICH
PhD in Computer Science July 2022 - Present
ELLIS PhD Student
ETH & MPI CLS Fellow

UNIVERSITY OF SOUTHERN CALIFORNIA
MSc in Computer Science Sept. 2021 - June 2022 (Incomplete)
Viterbi Fellow

BILKENT UNIVERSITY
MSc in Mechanical Eng.
BSc in Electrical Eng.
Sept. 2019 - June 2021
Excellence Fellow
Research Award

RESEARCH EXPERIENCE

ETH ZÜRICH & MAX PLANCK INSTITUTE | Scientific Researcher July 2022 – Present

- Conducting research on **reinforcement learning**, **video diffusion models** and **LLMs** under the supervision of Michael Black, and Andreas Krause.
- Developed **RILe**, a novel imitation learning framework that outperforms state-of-the-art by up to 20%, significantly enhancing the capability of **imitation learning for robotics**.
- Pioneered **NIL**, the first **imitation learning** approach **leveraging video diffusion models**, achieving competitive performance with methods using motion capture data.

SYSTEMS LAB, BILKENT UNIVERSITY | Researcher March 2017 – July 2022

- Conducting research on **reinforcement learning** and **game theory**.
- Combined **reinforcement learning** with **game theory** to model human behaviors surpassing state-of-the-art performance, and authored an Annual Reviews in Control article, which details innovative methods for **integrating RL with game theory** in complex human behavior modeling.

OZER'S LAB, BILKENT UNIVERSITY | Researcher January 2020 – December 2020

- Conducting research on **object detection** and **video understanding**.
- Developed SyNet, a **novel object detection framework** that achieves a 10% performance improvement in detecting objects in UAV images.

PROJECTS

RILE – REINFORCED IMITATION LEARNING

- Developed RILe, an imitation learning framework that outperforms state-of-the-art by 20% in humanoid robot locomotion.
- RILe employs a novel trainer–student framework, and learns an adaptive reward function along with an imitation policy.

NIL – NO-DATA IMITATION LEARNING

- Created NIL, an imitation learning approach that achieves state-of-the-art performance without using any explicit data.
- NIL leverages pretrained video diffusion models to generate robot videos, and learns physically plausible policies from them.

SKILLS

EXPERTISE: • Imitation Learning • Reinforcement Learning • Diffusion Models • Robotics/Autonomous Systems • LLMs

TECHNICAL SKILLS: • Python • C++ • Java • C | • JAX • PyTorch • Tensorflow • Numpy | • MuJoCo • Isaac Lab

TOP PUBLICATIONS

- Link **NIL: No-data Imitation Learning by Leveraging Pre-trained Video Diffusion Models**. On arXiv and Under Review
- Link **RILe: Reinforced Imitation Learning**. Accepted at 7th Robot Learning Workshop @ ICLR 2025 and Under Review
- **Moving by Looking: Towards Vision-Driven Avatar Motion Generation**. (Under Review)
- Link **A 3D Game Theoretical Framework for the Evaluation of Unmanned Aircraft Systems Airspace Integration Concepts**. Transportation Research Part C: Emerging Technologies, 133.
- Link **Driver Modeling through Deep Reinforcement Learning and Behavioral Game Theory**. IEEE Transactions on Control Systems Technology, 30.
- Link **SyNet: An Ensemble Network for Object Detection in UAV Images.** International Conference on Pattern Recognition (ICPR), IEEE.
- Link **Modeling Cyber-physical Human Systems via an Interplay between Reinforcement Learning and Game Theory**. Annual Reviews in Control, 48.

ACCOMPLISHMENTS

- Ranked top 0.0001% of all Turkish students in National University Graduate Examinaton
- Informatics Olympiad Participant