Hakan E. Aktas

Cambridge, UK hea39@cam.ac.uk hakanaktas0.github.io /hakan-emre-aktas

Education

University of Cambridge *Sep 2024 – Present*
MPhil in Advanced Computer Science

- Fully funded by Cambridge Trust
- **Coursework:** Principles of Machine Learning Systems, Machine Learning and the Physical World, Machine Visual Perception, Theory of Deep Learning, Geometric Deep Learning

Bogazici University *Sep 2020 – Jun 2024*
BS in Computer Engineering

- GPA: 3.79/4.0
- Ranked as 2^{nd} among over 2.5 million students (%0.00008) in the national university admission exam
- **Relevant Coursework:** Deep Learning in Robotics, Artificial Intelligence (audit), Computer Vision, Parallel Programming, Probability and Statistics, Signal Processing, System Simulation, Deep Learning, Machine Learning

Research Experience

Researcher *EU HORIZON*
INVERSE *Dec 2023 – Present*

- The INVERSE project aims to enhance robotic capabilities by adopting a continual learning approach, enabling machines to understand and execute tasks in diverse environments. This involves a human-supervised refinement loop, ensuring practical deployment in real-world scenarios and showcasing adaptability through fault detection and recovery strategies.
- Working on several work packages ranging from the use of Augmented Reality for safety to Symbolic Representation Learning for multi-level planning

Research Assistant *Tokyo, Japan*
The Wen Lab, Rikkyo University *Jul 2023 – Present*

- Working on the analysis part of an agency and ownership study that aims to determine the differences between exploration and exploitation actions.
- Working on analyzing
- Performed various analysis techniques such as PCA on a large face-mesh dataset composed of the data collected from over 20 human subjects.
- Supervised by Prof. Wen Wen, Prof. Acer Chang and Prof. Jie Mei

Undergraduate Researcher *Tokyo, Japan*
Cognitive Developmental Robotics Lab, The University of Tokyo *Jun 2023 – Jan 2024*

- Worked independently on a project focusing on designing, implementing, and validating a deep learning model that unifies continuous trajectories to obtain discrete affordance representations from continuous motion trajectories in a common latent space.
- Conducted simulated and real robot experiments to show the system behavior with multiple agents and entities/objects.
- Supervised by Prof. Yukie Nagai and Prof. Erhan Oztop

Undergraduate Researcher *Istanbul, Turkey*
Cognitive Learning and Robotics Lab, Bogazici University *Sep 2022 – Present*

- Worked on the exoskeleton project funded by Bogazici University that aims to develop a novel wearable exoskeleton with flexible clothing for the use of paraplegic people. My contributions included implementing control scripts using ROS.
- • Led my own research project on correspondence learning between robots with different embodiments. Conducted several simulated and real robot experiments and performed latent space analysis. Compared

to the baseline method, our method achieved %52 less trajectory error, and was significantly less computationally heavy on scale.

- Contributed to a research project on using planners alongside Deep Neural Networks. Devised a new continuous planning algorithm to fully utilize the deep learning model. Conducted experiments to evaluate the planner's performance under different settings. Compared to well-established planners such as A*, the planning algorithm reduced the final object positional error by at least %40 across trials.
- used deep learning and data analysis frameworks such as Tensorflow, PyTorch, Numpy, and Pandas. Conducted simulated and real robot experiments using Coppeliasim, PyBullet, and ROS.
- Supervised by Associate Professors Emre Ugur and Erhan Oztop

Industry Experience

Software Engineer Intern *Istanbul, Turkey*
Hazelcast *Jul 2022 – Sep 2022*

- Worked on the C++ client of an open-source distributed database platform.
- Implemented XML configuration support for C++ client, enabling users to configure the client declaratively.
- Contributed to open-source GitHub repository via code samples and documentation that demonstrate the usage of new features.
- Fixed a bug that compromised the consistency of the client's CP subsystem.
- Updated and corrected the parts of the client documentation that mislead the users.
- Carried out reviews, tests, and QA tasks.

Publications

Action plan diversity in children during control exploration: Link between action and sense of agency 2024

W. Wen, ***H. Aktas***, A. Chang, J. Mei, Y. Suzuishi, Y. Nagai, S. Kasahara

Submitted to Cognitive Computation
10.31234/osf.io/84b7h

VQ-CNMP: Neuro-Symbolic Skill Learning for Bi-Level Planning 2024

H. Aktas, E. Ugur

CORL 2024 LEAP Workshop (Accepted)
10.48550/arXiv.2410.10045

Cross-Embodied Affordance Transfer through Learning Affordance Equivalences 2024

H. Aktas, Y. Nagai, M. Asada, M. Saveriano, E. Oztop, E. Ugur

Submitted to IEEE Transactions on Cognitive and Developmental Systems
10.48550/arXiv.2404.15648

Correspondence learning between morphologically different robots via task demonstrations 2024

H. Aktas, Y. Nagai, M. Asada,E. Oztop,E. Ugur

IEEE Robotics and Automation Letters
10.1109/LRA.2024.3382534

Multi-step planning with learned effects of partial action executions 2024

H. Aktas, U. Bozdogan, E. Ugur

Advanced Robotics
10.1080/01691864.2024.2336251

Exploring control over others' face: Two pathways linking sense of agency and behavior 2024

W. Wen,J. Mei, ***H. Aktas***, A. Chang, Y. Suzuishi, S. Kasahara

Scientific Reports
10.1038/s41598-024-66316-2

Poster Presentations

Is It Me or Is It You? Disassociated Agency and Ownership in a Face and Action Mixing Paradigm. 2023

W. Wen, ***H. Aktas***, J. Mei, A. Chang, K. Takada, Y. Suzuishi, S. Kasahara

Body Representation Network (BRNet) Conference.
Mallorca, Spain

Imitation Between Robots with Different Morphologies 2023

H. Aktas, Y. Nagai, M. Asada, E. Oztop, E. Ugur

International Symposium on Predictive Brain and Cognitive Feelings.
Tokyo, Japan.

Affordance Blending Networks 2024

H. Aktas, E. Ugur

Graduation Poster. Bogazici University Department of Computer Engineering.
3^{rd} place among all graduation posters. Only research-oriented poster that has won an award in recent years.
Istanbul, Turkey.

Neural Discrete Representation Learning for Bi-Level Planning. 2024

H. Aktas, E. Ugur

IRCN and Chen Institute Joint Course on Neuro-inspired Computation.
Tokyo, Japan.

Teaching Experience

Teaching Assistant *Artificial Intelligence*

- Class of 45 students
- Prepared assignments and held supplementary discussion sessions.

Teaching Assistant *Deep Learning in Robotics*

- Class of 15 students
- Prepared assignments, gave a talk on my research, and held supplementary discussions.

Professional Contributions and Services

Reviewer *2023-Present*

- IEEE Robotics and Automation Letters - 1 paper
- IEEE ICRA 2025 - 3 papers
- IEEE Humanoids 2024 - 2 papers
- Conference on Robot Learning 2024 - 2 papers
- IEEE IROS 2024 - 2 papers