Hao Zhu

PhD student

Neurorobotics Lab
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https://haozhu10015.github.io

Education

2024– **PhD in Computer Science**, *University of Freiburg*, Freiburg i. Br., Germany
Advisors: Prof. Joschka Boedecker

2021–2023 **M.Sc. in Neuroscience**, *University of Freiburg*, Freiburg i. Br., Germany
GPA - 3.8 | German grade - 1.3
Thesis: *Deciphering Decision Making with Inverse Reinforcement Learning*
Advisors: Prof. Ilka Diester, Prof. Joschka Boedecker

2016–2020 **B.Sc. Chemical Biology**, *Nankai University*, Tianjin, China
GPA - 3.6 | average grade 89.4/100
Thesis: *Identification of Functional Residues in the Human Protoporphyrinogen Oxidase with the Network Model and Site-Directed Mutagenesis*
Advisors: Prof. Xin Wen, Prof. Zhen Xi

Academic Experience

2024– **Scientific Researcher**, *Neurorobotics Lab, University of Freiburg*, Freiburg i. Br., Germany
Part of the collaborative research project *IN-CODE* on 1) fundamental research of deep learning and (inverse) reinforcement learning, and 2) application of machine learning in neuroscience.

2022–2023 **Research Intern**, *Optophysiology Lab, University of Freiburg*, Freiburg i. Br., Germany
Led a research project on the mathematical modeling of rodent complex foraging behavior via (inverse) reinforcement learning.

2022 **Research Intern**, *Straw Lab, University of Freiburg*, Freiburg i. Br., Germany
Led a research project on 1) developing Kalman filter auto-tuning algorithm for animal tracking, and 2) designing event-camera-based lock-on tracker prototype, steering multiple cameras for tracking bees in the wild.

2017–2021 **Undergraduate Researcher/Research Assistant**, *State Key Laboratory of Elemento-organic Chemistry, Nankai University*, Tianjin, China
Led the National Training Program of Innovation and Entrepreneurship for Undergraduates project titled *Computational Simulation and Biological Verification for Different Species of Protoporphyrinogen IX Oxidase Amino Acid Interactions*, aiming at identifying key amino acid residues in protoporphyrinogen oxidase with computational quantum mechanics, molecular dynamics simulation, and graph theory.

Awards

2020 **Innovative Scientific Research Award for College Students**, *Nankai University*, China
Excellence Award

2018 **Asymchem Scholarship of Chemistry College**, *Nankai University*, China

2017 **Asymchem Scholarship of Chemistry College**, *Nankai University*, China

Membership

2024– IEEE

2024– IEEE Computational Intelligence Society

2024– German Neuroscience Society (GNS)

2024– Federation of European Neuroscience Societies (FENS)

Teaching

Lecture

2024 **Co-coordinator**, *Probabilistic Graphical Models*, University of Freiburg

Developed the course materials, including lecture notes, slides, and exercises. Conducted all tutorials and co-lectured during lectures.

2023 **Invited-lecturer**, *Reinforcement Learning*, University of Freiburg

Invited talk about the application of inverse reinforcement learning methods in neuroscience and cognitive science.

Seminar

2024 **Supervisor**, *Causality and Reinforcement Learning*, University of Freiburg

Supervised students on the topic: causal discovery for time series data.

Publications

Hao Zhu, Brice De La Crompe, Gabriel Kalweit, Artur Schneider, Maria Kalweit, Ilka Diester, and Joschka Boedecker. Multi-intention inverse Q-learning for interpretable behavior representation. *arXiv preprint arXiv:2311.13870*, 2023.

Baifan Wang, Zijuan Zhang, Hao Zhu, Congwei Niu, Xin Wen, and Zhen Xi. The hydrogen bonding network involved Arg59 in human protoporphyrinogen IX oxidase is essential for enzyme activity. *Biochemical and Biophysical Research Communications*, 557:20–25, 2021.

Services for Conferences and Workshops

Reviewer

ICML 2024 Workshop AutoRL, *2024*

References

- **Prof. Joschka Boedecker**
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  University of Freiburg
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○ **Prof. Ilka Diester**
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