

# Shiyu Huang (黄世宇)

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[OpenRL] [知乎] [GitHub] [Personal Website] [Google Scholar] [Linkedin]

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## Biography

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I am a researcher in Zhipu AI. Before that, I was a research scientist in 4Paradigm Inc. and the leader of OpenRL Lab. I received my B.E. and Ph.D. degrees (co-advised by Prof. Jun Zhu and Prof. Ting Chen) from the Department of Computer Science and Technology, Tsinghua University in July, 2017 and June, 2022. My researches focus on deep reinforcement learning, multi-agent reinforcement learning, distributed reinforcement learning, RL for robotics, LLM as agent, artificial general intelligence (AGI) and generative artificial intelligence (GAI). I have also spent time working at 4Paradigm Inc., RealAI Inc., Huawei Noah's Ark Lab, Tencent AI Lab, Carnegie Mellon University and SenseTime Inc. . And I am also the founder of the OpenRL Lab (1k+ GitHub stars).

## Education

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- **Tsinghua University**(清华大学), Beijing, China  
Doctor of Philosophy (PhD)(博士), Computer Science and Technology, co-advised by Prof. Jun Zhu and Prof. Ting Chen  
Sept. 2017 - Jun. 2022
- **Tsinghua University**(清华大学), Beijing, China  
Bachelor of Engineering(本科), Computer Science and Technology  
Aug. 2013 - Jul. 2017
  - cumulative GPA: **90/100**
  - Tsinghua Excellent Graduates (**top10%**)
  - won Academic Excellence Award every year
  - 四川省 2013 年高考理科前 30 名

## Work Experience

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- **Researcher**, Zhipu AI(智谱 AI), Beijing, China  
Mar. 2024 - Now
  - RL/Agent/AIGC/Embodied AI
- **Research Scientist**, 4Paradigm(第四范式), Beijing, China  
Jul. 2022 - Mar. 2024
  - Founder and leader of OpenRL Lab: <https://github.com/OpenRL-Lab/>.
  - Leader of developing distributed multi-agent reinforcement learning framework.
  - Leader of developing self-play reinforcement learning framework.
  - TiZero: Mastering Multi-Agent Football with Curriculum Learning and Self-Play.
- **Researcher**, RealAI(瑞莱智慧), Beijing, China  
Jun. 2021 - Apr. 2022
  - Leader of developing distributed multi-agent reinforcement learning framework.

- Leader of developing offline reinforcement learning benchmarks.
- TiKick: Towards Playing Multi-agent Football Full Games from Single-agent Demonstrations.
- **Research Intern**, Huawei Noah’s Ark Lab(华为诺亚), Beijing, China May. 2020 - Jun. 2021
  - Develop algorithms for circuit routing. The work is submitted to AAMAS 2022.
  - Do research for Deep Reinforcement Learning algorithms. The work is published on PRICAI 2021 and CoG 2022.
- **Research Intern**, Tencent(腾讯) AI Lab, Shen Zhen, China Apr. 2018 - Feb. 2019
  - Developed an AI agent for ViZDoom. The work is published on AAAI 2019.
- **Research Intern**, Carnegie Mellon University(卡内基梅隆大学), Pittsburgh, USA Jun. 2016 - Sep. 2016
  - Developed a detection framework. The work is published on CVPR 2017.
- **Research Intern**, SenseTime(商汤), Beijing, China Jun. 2015 - Dec. 2015
  - Vehicle Recognition and Face Verification.

## Publications & Preprints

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(\* equal contribution)

- [MQE: Unleashing the Power of Interaction with Multi-agent Quadruped Environment](#)  
Ziyang Xiong, Bo Chen, **Shiyu Huang**, Wei-Wei Tu, Zhaofeng He, Yang Gao  
arXiv:2403.16015, 2024
- [LLMArena: Assessing Capabilities of Large Language Models in Dynamic Multi-Agent Environments](#)  
Junzhe Chen, Xuming Hu, Shuodi Liu, **Shiyu Huang**, Wei-Wei Tu, Zhaofeng He, Lijie Wen  
arXiv:2402.16499, 2024
- [AutoSAT: Automatically Optimize SAT Solvers via Large Language Models](#)  
Yiwen Sun, Xianyin Zhang, **Shiyu Huang**, Shaowei Cai, Bing-Zhen Zhang, Ke Wei  
arXiv:2402.10705, 2024
- [OpenRL: A Unified Reinforcement Learning Framework](#)  
**Shiyu Huang**, Wentse Chen, Yiwen Sun, Fuqing Bie, Wei-Wei Tu  
arXiv:2312.16189, 2023
- [DGPO: Discovering Multiple Strategies with Diversity-Guided Policy Optimization](#)  
Wenze Chen, **Shiyu Huang**, Yuan Chiang, Tim Pearce, Wei-Wei Tu, Ting Chen, Jun Zhu  
Thirty-Eighth AAAI Conference on Artificial Intelligence(**AAAI**), Vancouver, Canada, 2024
- [SwiftSage: A Generative Agent with Fast and Slow Thinking for Complex Interactive Tasks](#)  
Bill Yuchen Lin, Yicheng Fu, Karina Yang, Prithviraj Ammanabrolu, Faeze Brahman, **Shiyu Huang**, Chandra Bhagavatula, Yejin Choi, Xiang Ren  
Thirty-seventh Conference on Neural Information Processing Systems(**NeurIPS**)(**Spotlight**), 2023
- [Robustness and Generalizability of Deepfake Detection: A Study with Diffusion Models](#)  
Haixu Song, **Shiyu Huang**, Yinpeng Dong, Wei-Wei Tu  
arXiv:2309.02218, 2023

- [Diverse Policies Converge in Reward-free Markov Decision Processes](#)  
Fanqi Lin, **Shiyu Huang**, Wei-Wei Tu  
The 20th Pacific Rim International Conference on Artificial Intelligence(**PRICAI**), Jakarta, Indonesia, 2023
- [Uncertainty quantification via a memristor Bayesian deep neural network for risk-sensitive reinforcement learning](#)  
Yudeng Lin, Qingtian Zhang, Bin Gao, Jianshi Tang, Peng Yao, Chongxuan Li, **Shiyu Huang**, Zhengwu Liu, Ying Zhou, Yuyi Liu, Wenqiang Zhang, Jun Zhu and He Qian  
**Nature Machine Intelligence**, 2023
- [TiZero: Mastering Multi-Agent Football with Curriculum Learning and Self-Play](#)  
Fanqi Lin\*, **Shiyu Huang\***, Tim Pearce, Wenze Chen and Wei-Wei Tu  
The 22nd International Conference on Autonomous Agents and Multiagent Systems(**AAMAS**), London, UK, 2023
- [Learning Graph-Enhanced Commander-Executor for Multi-Agent Navigation](#)  
Xinyi Yang, **Shiyu Huang**, Yiwen Sun, Yuxiang Yang, Chao Yu, Wei-Wei Tu, Huazhong Yang and Yu Wang  
The 22nd International Conference on Autonomous Agents and Multiagent Systems(**AAMAS**), London, UK, 2023
- [DGPO: Discovering Multiple Strategies with Diversity-Guided Policy Optimization](#)  
Wenze Chen, **Shiyu Huang**, Yuan Chiang, Ting Chen, Jun Zhu  
The 22nd International Conference on Autonomous Agents and Multiagent Systems(**AAMAS**) Extended Abstract, London, UK, 2023
- [VMAPD: Generate Diverse Solutions for Multi-Agent Games with Recurrent Trajectory Discriminators](#)  
**Shiyu Huang\***, Chao Yu\*, Bin Wang, Dong Li, Yu Wang, Ting Chen and Jun Zhu  
IEEE Conference on Games (**CoG**), Beijing, China, 2022. (**Best Paper Nomination**)
- [TiKick: Towards Playing Multi-agent Football Full Games from Single-agent Demonstrations](#)  
**Shiyu Huang\***, Wenze Chen\*, Longfei Zhang, Shizhen Xu, Ziyang Li, Fengming Zhu, Deheng Ye, Ting Chen and Jun Zhu  
**NeurIPS-21** Workshop: 2nd Offline Reinforcement Learning Workshop.
- [Ranking Cost: Building An Efficient and Scalable Circuit Routing Planner with Evolution-Based Optimization](#)  
**Shiyu Huang**, Bin Wang, Dong Li, Jianye Hao, Jun Zhu and Ting Chen  
**IJCAI-ECAI** 2022 Workshop: The 2nd International Workshop on Heuristic Search in Industry, Vienna, Austria, 2022.
- [Deep Reinforcement Learning with Credit Assignment for Combinatorial Optimization](#)  
Dong Yan, Jiayi Weng, **Shiyu Huang**, Chongxuan Li, Yichi Zhou, Hang Su, Jun Zhu  
**Pattern Recognition**, 2022.
- [Off-policy Training for Truncated TD\( \$\lambda\$ \) Boosted Soft Actor-Critic](#)  
**Shiyu Huang**, Bin Wang, Hang Su, Dong Li, Jianye Hao, Jun Zhu and Ting Chen  
The Pacific Rim International Conference on Artificial Intelligence (**PRICAI**), Hanoi, Vietnam, 2021.
- [SVQN: Sequential Variational Soft Q-Learning Networks](#)  
**Shiyu Huang**, Hang Su, Jun Zhu, and Ting Chen  
Eighth International Conference on Learning Representations (**ICLR**), Millennium Hall, Addis Ababa ETHIOPIA, 2020

- [Combo-Action Training Agent For FPS Game with Auxiliary Tasks](#)  
**Shiyu Huang**, Hang Su, Jun Zhu, and Ting Chen  
The Thirty-Third AAAI Conference on Artificial Intelligence (AAAI)(**Spotlight**), Honolulu, Hawaii, USA, 2019
- [Expecting the Unexpected: Training Detectors for Unusual Pedestrians with Adversarial Imposters](#)  
**Shiyu Huang**, and Deva Ramanan  
IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Honolulu, Hawaii, USA, 2017
- [Learning to Assign Credit in Reinforcement Learning by Incorporating Abstract Relations](#)  
Dong Yan, **Shiyu Huang**, Hang Su, and Jun Zhu  
AAAI-19 Workshop on Reinforcement Learning in Games
- [Model-based Credit Assignment for Model-free Deep Reinforcement Learning](#)  
Dong Yan, Jiayi Weng, **Shiyu Huang**, Chongxuan Li, Yichi Zhou, Hang Su, Jun Zhu

## Talks

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- **RLHF @ Zhiyuan Community**, 2023.8.
  - slide: <https://drive.google.com/file/d/1qh92DrnsN5yjEbk43nG4hlw2cZd1hnlub/view>
- **OpenRL @ 5th BAAI Conference**, 2023.6.
  - video: [https://www.youtube.com/watch?v=3\\_EtNuLJRdM](https://www.youtube.com/watch?v=3_EtNuLJRdM)

## Projects

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- **OpenRL: Unified reinforcement learning framework.**
  - 523 stars, 56 forks
  - <https://github.com/OpenRL-Lab/openrl>
- **TiZero: RL agents for Google Research Football.**
  - <https://github.com/OpenRL-Lab/TiZero>
- **TLaunch: Launch programs on multiple hosts.**
  - <https://github.com/TARTRL/TLaunch>
- **OpenPlugin: Toolkit to manage the plugins of the large language model.**
  - <https://github.com/OpenRL-Lab/OpenPlugin>

## Patents

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- **Generation method, device, medium and computing device of diversity strategy.**  
Shiyu Huang, Tian Tian. 2021116684627
- **Method or equipment for controlling agent.**  
Jun Zhu, Shiyu Huang, Hang Su. ZL201910078546.1

## Honors & Awards

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- **Tung OOCL Scholarship**, Tsinghua University, 2019
- **Tsinghua Excellent Graduates**, Tsinghua University, 2017
- **Academic Excellence Award**, Tsinghua University, 2014-2016

## Competitions

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- 2022.8  
**IEEE CoG 2022 Football AI Competition:**  
[Track2](#), 3rd place
- 2018.8  
**ViZDoom 2018 AI Competition:**  
[Track1](#), 1st place  
[Track2](#), 2nd place
- 2017  
**ViZDoom 2017 AI Competition:**  
[Track2](#), 2nd place

## Skills

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- **Programming:** C++/C, Python, Matlab, Java, Ruby, C#
- **OS:** Linux, MacOS, Windows
- **Software:** Tensorflow, Pytorch, OpenCV, Flask, Unity3D, Qt5.

## Services

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**Organizer for:**

**NeurIPS 2023 Workshop** on New in ML: <https://openrl.net/workshop/neurips2023newinml>

**Reviewer for:**

ICML 2024, ICLR 2024, AAAI 2024, **NeurIPS 2023**, AISTATS 2023, AAAI 2023, ICLR 2023, NeurIPS 2022, ICML 2022, AISTATS 2022, AAAI 2022, ICLR 2022, **NeurIPS 2021**, ICML 2021, AAAI 2021, **NeurIPS 2020**

## Teaching

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2020 Spring, TA in **Big Data and Machine Intelligence**, instructed by Zhen Chen

2019 Fall, TA in **Big Data and Machine Intelligence**, instructed by Zhen Chen

2019 Spring, TA in **Machine Learning**, instructed by Prof. Jun Zhu

## PS

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- OpenRL Lab: <https://github.com/OpenRL-Lab>
- Personal Website: <https://huangshiyu13.github.io>
- 知乎: <https://www.zhihu.com/people/huangshiyu.me>
- GitHub: <https://github.com/huangshiyu13>

- Google Scholar: <https://scholar.google.com/citations?user=PK57vrQAAAAJ&hl=en>
- LinkedIn: <https://www.linkedin.com/in/shiyu-huang-841b92106/>