Team Description Paper

RoboCup 2026 Humanoid League

Team Information

Team Name: Beihang RoboCup Team

Affiliation: Hangzhou Innovation Institute of Beihang University

Country: China

Team Member: Zitong Bai, Yiming Huang, Ye Gao, Yince Gao.

Contact Person: Zitong Bai (baizitong@buaa.edu.cn)

Team Overview

Our team is an experienced humanoid robotics research group with a strong background in humanoid locomotion, reinforcement learning–based control, and real-world robot deployment.

We have continuously participated in RoboCup-related competitions and international robotics challenges over recent years, achieving multiple award-winning results in humanoid robot contests.

The team focuses on robust whole-body control, perception-aware locomotion, and learning-based decision-making, with an emphasis on transferring policies from simulation to real humanoid robots. Through long-term participation in RoboCup and related competitions, we have accumulated practical experience in hardware integration, real-time control, and competition-oriented system engineering.

Competition Experience and Achievements

Our team has a solid competition history in humanoid robot leagues and related international events:

- 2021 RoboCup China Open – Second Prize, Humanoid League (KidSize)
- 2022 RoboCup China Open – Second Prize, Humanoid League (KidSize)
- 2023 The 4th RoboCup Asia-Pacific Tianjin Invitational Tournament – First Prize, RoboCup Soccer, Humanoid League (KidSize)
- IROS 2025 Mecha Challenge (Robot Dance Championship) – First Prize (Runner-up)

These results demonstrate our sustained capability in humanoid robot control, stability, coordination, and competition-level system reliability.

Supporting certificates for the above-mentioned competition results are provided as attachments for reference.

Technical Background

Humanoid Locomotion and Control

Our team has extensive experience in humanoid locomotion, including:

- Bipedal walking, turning, and disturbance recovery
- Multi-contact motion and balance control
- Online decision-making under real-time constraints

We adopt a learning-based locomotion framework, combining reinforcement learning with physics-based modeling to ensure both adaptability and stability during dynamic tasks such as walking and ball interaction.

Reinforcement Learning Framework

We actively develop and maintain an open-source reinforcement learning extension for legged and humanoid robots, built on top of Isaac Lab and designed to support development in an isolated and modular environment, independent of the core Isaac Lab repository:

- Project: legged_lab
- GitHub Repository: https://github.com/zitongbai/legged_lab
- Status (Jan. 30, 2026): 200+ GitHub stars

The framework supports:

- DeepMimic-style motion imitation for humanoid robots, including support for platforms such as Unitree G1.
- Adversarial Motion Priors (AMP) for humanoid robots, enabling robust learning from human motion data.
- Compatibility with large-scale simulation environments provided by Isaac Lab, facilitating efficient training and evaluation.

This open-source project has been widely used and referenced by the robotics community, reflecting the technical maturity and reproducibility of our approach.

System Integration for RoboCup

For RoboCup 2026, our humanoid soccer system is designed with:

- Robust walking and recovery behaviors for continuous gameplay
- Learning-based motion control adaptable to external disturbances
- Modular software architecture, enabling rapid iteration and debugging during competitions
- Competition-proven engineering practices, accumulated from multiple RoboCup and international events

The system is specifically tailored to meet the real-time, robustness, and safety requirements of the Humanoid League.

Contribution to RoboCup Community

In addition to competition participation, our team contributes to the RoboCup and robotics community through:

- Open-source software for humanoid and legged robots
- Public technical documentation and reproducible research code
- Experience sharing with students and researchers in humanoid robotics

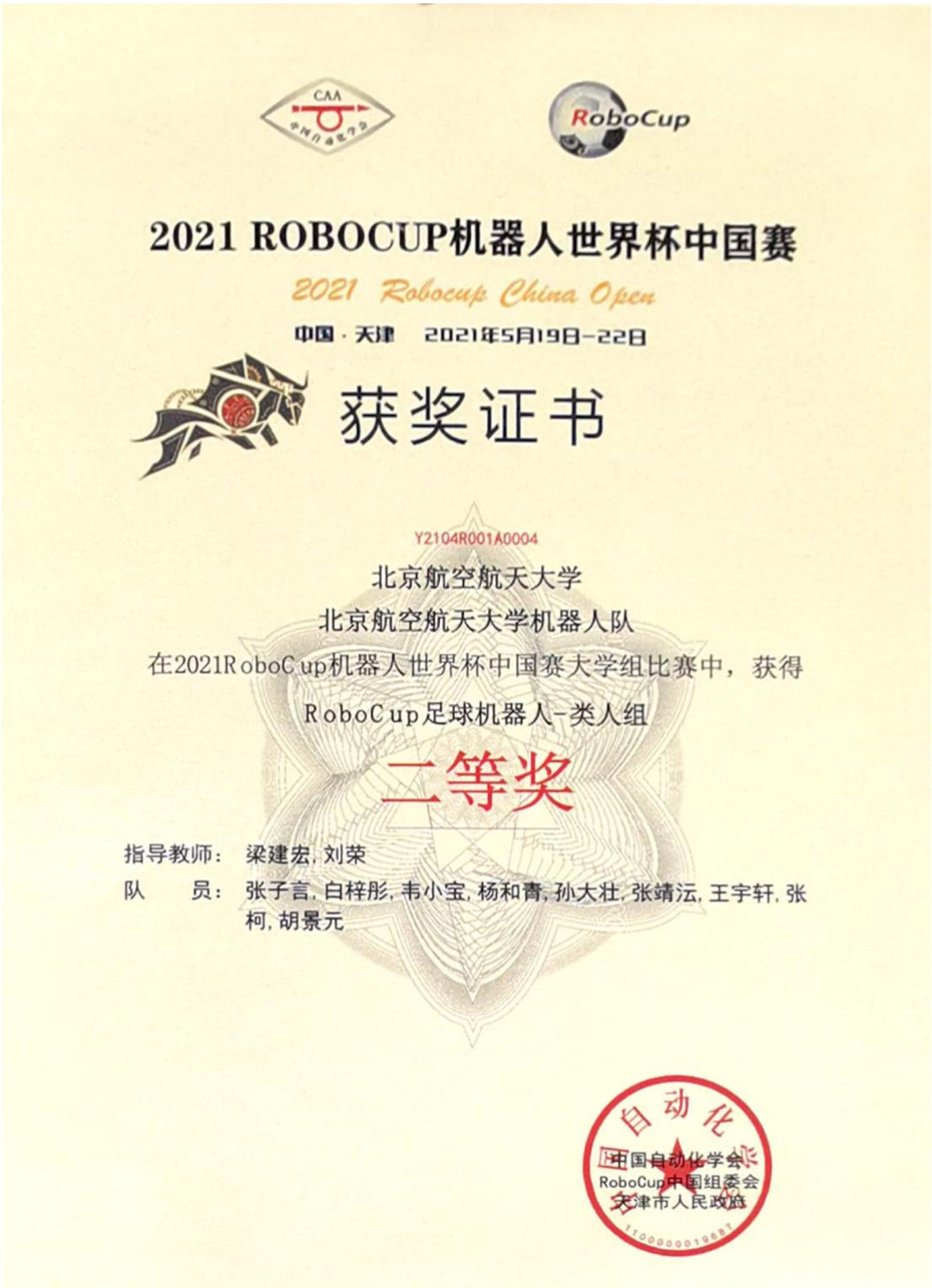
We believe that open research and shared tools are essential for advancing humanoid robot soccer.

Conclusion

With a strong record of award-winning RoboCup participation, a mature reinforcement learning–based humanoid control framework, and an active open-source presence, our team is well prepared to participate in RoboCup 2026 Humanoid League.

We are confident in our ability to contribute competitively and technically to the RoboCup community.

Appendix A: Award Certificates



2021 ROBOCUP机器人世界杯中国赛

2021 Robocup China Open

中国·天津 2021年5月19日-22日

获奖证书

Y2104R001A0004

北京航空航天大学

北京航空航天大学机器人队

在2021RoboCup机器人世界杯中国赛大学组比赛中，获得

RoboCup足球机器人-类人组

二等奖

指导教师： 梁建宏, 刘荣

队　　员： 张子言, 白梓彤, 韦小宝, 杨和青, 孙大壮, 张靖沄, 王宇轩, 张柯, 胡景元

中国自动化学会
RoboCup中国组委会
天津市人民政府

2022中国机器人大赛暨 ROBOCUP 机器人世界杯中国赛

线上 · 2022年11月25日—27日

获奖证书

Y2209R001A0004

北京航空航天大学

北京航空航天大学机器人队

在 2022中国机器人大赛暨RoboCup机器人世界杯中国赛比赛中，获得

RoboCup足球机器人-类人组

二等奖

指导教师： 从保强, 刘荣, 齐建立

队　　员： 谢晓勇, 白梓彤, 杨和青, 张峰菩, 黄顺晓, 董文逸, 景泓斌, 刘洋, 张钊, 唐雨洁, 邱铭治, 张靖沄, 张子言, 韦小宝, 孙泽一, 孙大壮

中国自动化学会

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RCAPTJI23RCSD30C225A

荣誉证书

HONORARY CREDENTIAL

北京航天航空大学 北航机器人队在2023亚太机器人世界杯天津国际邀请赛(5月19-21日)中，荣获RoboCupSoccer Humanoid League

一等奖

指导老师：刘荣、梁建宏、齐建立

参赛队员：谢晓勇、唐雨洁、张钊、董文逸、黄顺晓、黄浩宇、景泓斌、刘洋、冯智强、赵书永、白梓彤

世界智能大会组织委员会 清华大学机械工程系 天津海河教育园区管理委员会

天津市教育委员会 天津市科学技术协会 天津市机器人产业协会

RCAPTJI23RHLKID0347P

The 4th RoboCup Asia-Pacific Tianjin Invitational Tournament

19 - 21 May 2023 • Tianjin China

CERTIFICATE OF PARTICIPATION

Presented to

Zitong Bai

Beihang University, China

RoboCupSoccer, Humanoid League (KidSize)

Team: Beihang Robotics Team

Li Liu, Ph.D.
General Chair
RCAP Tianjin Invitational Tournament 2023

Changjiu Zhou, Ph.D.
President
RoboCup Asia-Pacific (RCAP) Confederation

IROS Hangzhou 2025

19th – 25th October

The 2025 IEEE RSJ International Conference on Intelligent Robots and Systems

Human-Robotics Frontier

MECHA CHALLENGE
(ROBOT DANCE CHAMPIONSHIP)

FIRST PLACE

PRESENTED TO:

HANGZHOU INSTITUTE OF INNOVATION,
BEIJING UNIVERSITY OF AERONAUTICS AND ASTRONAUTICS

SWFOUR

GAO YINCE, HUANG YIMING, GAO YE, BAI ZITONG

COMPETITION CHAIRS:

Qingdu Li
University of Shanghai for Science and Technolog

Yue Gao
Shanghai Jiao Tong University

Xuesu Xiao
George Mason University