Software Survey 2026

Team name

SJTU Cyber Shanhai

Which division(s) are you applying for? If your used software differs between divisions, please fill out the survey once per division.

Large Size (height < 190 cm, weight < 80 kg)

Is your software fully or partially OpenSource? If so, where can it be found?

Not OpenSource yet, but stay tuned for a possible release.

Are you using any software developed by other teams? If so, list every component that you are reusing and the team that originally developed it.

For the vision component, we integrated code from team BHuman (Standard PlatformLeague) and team Tsinghua Hephaestus (Humanoid League). Regarding the strategymodule, we utilized the relevant codebase from team SRC (Small Size League).

Are you using any datasets in your research? If you are using your own datasets, are they public?

Yes, we utilized datasets for vision recognition, locomotion, and other components. Thesedatasets were collected in-house; they are currently private but may be open-sourced in thefuture.

Please list the scientific publications your team has made since the last application to RoboCup (or if not applicable in the last 2 years).

[2025]

Wang, H., Zhang, M., Zhang, L., Zhu, X., & Cao, Q. (2025). Real-Time Hand GestureRecognition in Clinical Settings: A Low-Power FMCW Radar Integrated Sensor System with

Multiple Feature Fusion.Wang, Y., Zeng, F., Zhu, X., & Leng, C. (2025, April). Design of a Reinforcement Learning-Based Lightweight Adaptive PID Controller for Low-Computational-Resource Platforms.

[2024]

Zhu, X., Zhou, H., Zhu, X., & Wang, K. (2024, October). A Novel Caterpillar-Inspired VascularInterventional Robot Navigated by Magnetic Sinusoidal Mechanism.

Are there any other contributions you would like to share with the RoboCup community?

No

Which approach are you using to generate the robot walking motion?

We use Imitation and Reinforcement Learning to generate the robot walking motion.

Which approach are you using to generate other motions of the robot (e.g. kicking, standing up)?

We also use Reinforcement Learning with AMP to generate the robot walking motion.

Do you have a kinematic or dynamic model of your robot? If so, how did you create it (e.g. measure physical robot, export from CAD model)?

Yes, we developed a dynamic model for the robot by exporting data from CAD. However, werarely use it in practice, as we primarily rely on simulations to train our walking gaits.

What approaches are you using in your robot's visual perception?

We use a hybrid approach combining YOLOv8 and traditional Line Segment Detection (LSD)algorithms for visual perception.

Are you planning with objects in Cartesian or image space? If you are using Cartesian space, how do you transform between the image space and cartesian space?

We perform motion planning in Cartesian space. First, the extrinsic parameters between thecamera and the robot base are obtained through calibration. Then, the object's pose in thedepth camera coordinate system is transformed into the robot's base coordinate system.Weperform motion planning in Cartesian space. First, the extrinsic parameters between thecamera and the robot base are obtained through calibration. Then, the object's pose in thedepth camera coordinate system is transformed into the robot's base coordinate system.

Do you have some form of active vision (i.e. moving the robots camera based on information known about the world)?

Yes. For example, we perform active camera control to enhance the stability of ball tracking.

What approach are you using to localize your robot?

We employ Adaptive Monte Carlo Localization (AMCL) for robot positioning. The visualfeatures of the white field lines are used for position correction, while an optimized robotodometry is integrated to enhance localization accuracy and stability.

Is your team performing team communication? Which communication protocol are you using?

Yes, we primarily use a custom UDP-based protocol for intra-team communication.

What approach are you using for navigation? Are you avoiding obstacles?

We employ the A algorithm* for long-range path planning, while utilizing the DynamicWindow Approach (DWA) for local obstacle avoidance.

How is the behavior of your robots structured? (e.g. Behaviour Trees)

Behaviour Trees.

Are you simulating your robot? If so, which simulator are you using and for what purpose do you use simulations?

We employ a suite of advanced simulation environments, including Isaac Gym, Isaac Lab,and MuJoCo. This multi-platform approach allows us to validate our control policies againstdiverse physics engines, ensuring high fidelity and robustness before hardware deployment.
The purpose of our simulations:Data-Driven Control (DRL & IL): Our architecture represents a paradigm shift from classicalmodel-based methods to a data-driven Deep Reinforcement Learning (DRL) framework. Weuse these simulations to train whole-body control policies by integrating Imitation Learning(IL) with motion capture retargeting.

What operating system is running on your robot and which middleware are you using (for example Ubuntu 22.04 and ROS2 Galactic)?

Ubuntu 22.04 and ROS2 Galactic

Is there anything else you would like to share that did not fit any previous question?

No.