Software Survey 2026

Team name

Talos Humanoid Robots Team

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?

https://github.com/AKCIT-RL/robocup_t1

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.

We are using mainly the robocup_demo provided by Booster Robotics overwrite mainly our strategics at the behavior tree, implementing different functions to call kicks, developing passes and set plays.

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

We are studying new motions to be added at real time matches by developing a dataset with motion captured moves that will be published soon.

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

Since we are a new team, our scientific publications/contributions are related to previously related members at the Pequi Mecanico. We are looking further to deliver new publications at the Robocup Symposium 2026 with papers about Motion Capture Dataset and Dynamic Passing in Set Plays

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

Mainly our codebase, motion capture dataset and our algorithms and implementations to

develop passes

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

Reinforcement Learning Bipedal walking Policy provided by the fabricant(Booster Robotics SDK 1.2).

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

Reinforcement Imitation Learning(GMR, BeyondMimic), HTWK Train and Booster Train.

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 it is, provided by the fabricant(Booster Robotics)

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

We are training and evaluating the usage of YOLOv11 in comparation with the default model provided by the fabricant.

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 plan with objects in Cartesian space. The transformation from 2D image space to 3D Cartesian coordinates occurs within the vision module, which first calculates the camera's extrinsic pose relative to the T1 base. Once the perception stack detects an object(focus on the field lines to produce localization) in the image space, the system routes the bounding box to a class-specific pose estimator. Using the camera intrinsic parameters, these estimators project the 2D pixels into real-world Cartesian coordinates via two parallel methods: either by directly extracting the distance from an aligned depth map provided with zed stereo processin, or by projecting a ray from the image coordinates to calculate its geometric intersection with the ground plane.

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

Mainly Ball tracking and we are improving on tracking interesting positions on field, such as

following open spaces to perform set plays.

What approach are you using to localize your robot?

We are using a Particle Filter (Monte Carlo Localization) approach that is integrated into a behavior tree framework. For each particle, the algorithm calculates a residual error by comparing the transformed local observations against a known global map of the field, converting these errors into probability densitie. Additionally, the Behavior Tree structure enables the robot to dynamically switch between full global localization and fast, targeted position resets using specific nearby landmarks to efficiently correct odometry drift. We do not change as much the default software provided by Booster Robotics.

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

Yes, by UDP.

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

We use a reactive, state-based navigation approach governed by a Behavior Tree, bypassing heavy global path planners.Yes, we avoid obstacles by using grid-based depth perception to identify obstacles and maintains a dynamic "obstacle memory" that tracks and expire objects over time. Evasive maneuvers are executed base on predefining safe distances and time-to-collision thresholds.

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

Highly dependant of Behaviour Trees but we are testing some new input behavior directly on early tests of our vision models(still too premature to describe better).

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

Yes, we are using simulation mainly to test new movements. Isaac Lab 5.0 for training, Isaac Sim and MuJoCo for validating movements.

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 Humble.

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