

Software Survey 2026

Team name

Badger Bots

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

Middle Size (height < 125 cm, weight < 25 kg)

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

No, but it is built on the open source Booster RoboCup demo.

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.

Vision:

We are planning on using the base vision code provided by Booster in their RoboCup demo code. It includes a pre-trained neural network that can identify the ball and field lines.

Localization:

We plan on using the localization module developed by the BHuman team for the 2024 competition and adapted for the Booster codebase by the UTAustin Villa team for the 2025 competition.

Team Communication:

We plan on building off of the Booster RoboCup demo to allow for communication while following the 2026 competition rules.

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

N/A

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

WeRef: An Open-source and Extensible Dataset for Referee Gesture Recognition in RoboCup. Shao and Hanna.

RoboCup-2025: Robot Soccer World Cup XXVIII. July 2025.

Multi-Robot Collaboration through Reinforcement Learning and Abstract Simulation.

Adam Labiosa, Josiah P. Hanna. ICRA 2025.

Reinforcement Learning Within the Classical Robotics Stack: A Case Study in Robot Soccer.

Labiosa et al. ICRA 2025.

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

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

We plan on using locomotion policies trained with reinforcement learning in the MJX simulation with the PPO algorithm. Training will be similar to the MuJoCo Playground

[<https://playground.mujoco.org/>] setup.

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

We will adopt a combination of Booster's open source motions and RL-trained policies.

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, open-source from Booster

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

We are planning on using the base vision code provided by Booster in their RoboCup demo code. It includes a pre-trained neural network that can identify the ball and field lines.

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 to rely on Booster's open source vision module for our first year. Planning will be done in Cartesian space but we have not yet implemented the transform.

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

Not currently.

What approach are you using to localize your robot?

We plan on using the localization module developed by the BHuman team for the 2024 competition and adapted for the Booster codebase by the UTAustin Villa team for the 2025 competition. The module uses a particle filter with built in robot soccer domain knowledge.

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

We plan on building off of the Booster RoboCup demo to allow for communication while following the 2026 competition rules.

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

We primarily intend to use RL-trained behaviors that directly output walk commands, keeping in mind both avoiding obstacles and reaching an intended target.

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

Combination of behavior trees and reinforcement learning trained policies.

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

We have been developing our codebase using the RoboCup 3D Mujoco simulator. We've integrated our codebase with it and are now adding in the ability to simulate the K1.

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

ROS2 and Ubuntu 24.04

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