UT Austin Villa 2025 AdultSize Extended Abstract

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Abstract. UT Austin Villa is a new entrant in the RoboCup Humanoid League AdultSize competition. We introduce our team, outline our hardware and software infrastructures, and present our short-term development plans to enhance our robots' agility and perception. We also discuss several research directions—whole-body control, learning from human soccer videos, and multi-agent coordination—that we aim to pursue using RoboCup as a testbed.

1 Introduction

UT Austin Villa, a newly formed team competing in the RoboCup Humanoid League AdultSize category, seeks to advance humanoid robotics through agile motion control, robust perception, and multi-agent strategy. While new to this competition, we build on established robotics and AI research traditions at The University of Texas at Austin.

We briefly describe our initial hardware platform, current software capabilities, and immediate plans for the next six months. These efforts target improved locomotion, perception, and team coordination. Beyond the competition, we aim to leverage RoboCup as a platform for research on whole-body control, visual imitation learning, and multi-agent strategies.

2 Hardware

Our primary platform, *Booster T1*, is a 1.18-meter-tall humanoid robot with 23 degrees of freedom and omnidirectional walking capability. It is equipped with a RealSense D455 RGB-D camera for ball tracking. We currently possess two of these robots, enabling us to explore multi-robot strategies. Additional sensors and actuators may be integrated as we refine the robot's agility and stability.

3 Software

Our current software framework is a combination of C++ and Python, with data streaming handled through ROS2. We rely on a Booster SDK that provides baseline ball detection and a default locomotion gait. To become competitive, we will

enhance locomotion for quicker turns and stable kicking, improve ball detection with more robust vision algorithms, integrate multi-agent coordination, and incorporate official RoboCup rules into the decision-making loop.

4 Research Interests

Learning Whole-Body Control: We aim to develop controllers that move beyond standard gaits. Through reinforcement learning, we seek agile, whole-body behaviors suited for dynamic soccer scenarios.
Learning from Human Soccer Videos: We will explore using abundant soccer footage to facilitate policy learning. By extracting movement primitives and tactics, we hope to achieve more natural and adaptable robot behaviors.
Multi-Agent Coordination: RoboCup's team-based competitive game setting provides a rich environment for studying multi-agent collaboration, competition, communication, and role allocation. Our goal is to develop teams that adapt to diverse opponents and non-stationary conditions.

Members of UT Austin Villa bring a strong background in research related to computer vision, control, and multi-agent learning [5, 3, 4, 2, 1]. The RoboCup platform provides a unique environment where these research directions can be integrated and tested, yielding innovations that we hope will be valuable both in the competition and in the broader robotics and AI communities.

5 Conclusion

UT Austin Villa is excited about participating in RoboCup 2025 with a robust hardware platform, a flexible and extensible software stack, and a focus on diverse research topics. We look forward not only to competing, but also to leveraging the competition as a perfect research platofrm where we can develop, test, and refine advanced methods in whole-body control, vision-based skill acquisition, and multi-agent coordination.

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