

ROSboCup: A ROS-based Framework for RoboCup Soccer

Robert King¹, Shashank Bhatia², and Jason Kulk²

¹ School of Mathematical and Physical Sciences
University of Newcastle, Australia
`robert.king@newcastle.edu.au`

² School of Electrical Engineering and Computer Science
University of Newcastle, Australia
`{shashank.bhatia, jason.kulk}@newcastle.edu.au`

Abstract. The development of software systems to compete in RoboCup’s soccer leagues is a large and complicated task. The software framework on which the system is based places restrictions on the software in terms of supporting multiple platforms and leagues, and on its modularity.

There are many existing frameworks in the RoboCup domain, however, they are not widely used outside of the authoring team, and are not shared across different robot platforms or leagues. Furthermore, the frameworks have little application outside of RoboCup.

In this proposal, we suggest that a community owned open-source framework for RoboCup’s soccer leagues be developed based on Willow Garage’s Robot Operating System (ROS).

A significant amount of time spent preparing an entry into a RoboCup soccer league is used on the development of the underlying software framework. Essentially, the software framework provides an abstraction layer that allows software components to communicate with each other, and the robot hardware, in a standard way. The software framework also provides a set of tools to ease the implementation of common tasks, such as serialisation and debugging.

There are numerous examples of software frameworks used in the RoboCup soccer arena [1–4]. There are several reasons existing frameworks are not widely adopted by the community. Firstly the frameworks are often very focused on a particular robot platform and league, making the simultaneous support of multiple robot platforms difficult.

The software frameworks also make use of non-standard solutions to standard problems. For example, [3] provides custom vector and serialisation implementations, when standard implementations are provided in the C++ standard template library, and in C++ boost libraries. This presents a problem to the wide-spread adoption because of the reluctance to learn these custom libraries which are not used outside of RoboCup.

Another issue with existing software frameworks is the barebones software framework is not released separately. That is, there is no separation between the

framework and the actual software modules in the code releases of successful teams.

Willow Garage’s ROS is a component-based software framework for robotics [5]. ROS has an active community and is widely used in research projects and in industry. Consequently, the use of ROS by RoboCup teams is likely to increase significantly in the coming years. However, using ROS alone does not standardise the software system enough to guarantee the interoperability of the software modules required by a RoboCup soccer team, and few of the platforms used at RoboCup are supported by the existing ROS libraries.

We propose the use of the ROS framework to construct a open-source framework to meet the needs of the RoboCup soccer community. In particular, support for the NAO, the DARWIN-OP, and the 2D and 3D simulation leagues will be added. Furthermore, standard interfaces will be implemented for the common software modules; vision, localisation, behaviour and motion.

The new framework will benefit the RoboCup community by allowing the effective sharing of code between teams of the same league, but also between leagues.

References

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