

SimSpark for Standard Platform League

Open Challenge Description 2012

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The robot simulator *SimSpark* is being developed within the Simulation 3D League (S3L). Although, it is developed within the RoboCup community it is not used much in other leagues. Instead, teams tend to develop own simulators or use commercial solutions, e.g., Webots. Designing and implementing a good robot simulator is a difficult and time consuming task, so it makes sense to reuse the work which has already been done in S3L. Extending the SimSpark for hardware leagues will bring benefits for all sides: the developer and the user community of SimSpark would grow, the simulator becomes more realistic as it is required by the hardware leagues and transfer of the solutions between the leagues becomes easier.

With this contribution to the open challenge we seek to present our work which has been done to make SimSpark more realistic and adjust it to the needs of SPL and to encourage other teams to join our idea, as we believe it will move the whole RoboCup community a step forward.

We started to participate in SPL and S3D with the same code base in 2010. Since then we started to work on bringing both leagues closer together¹. So far we made a number of important steps to make SimSpark usable in SPL. The sensors of the simulated robot have been extended similar to the real Nao. In particular, along with the usual virtual vision a camera is available providing rendered images. The parameters of the simulator have been optimized by genetic algorithms to fit the dynamics of the real Nao. Thereby, a capturing system based on a Kinect was used to provide the difference between the simulated and the real robot movements as fitness (cf. Fig. 1:left). Detailed results will be published soon². The game environment and the rules of SPL have been implemented, i.e., field, ball, goals and etc.; The Fig. 1:right shows a simulated SPL game. We also implemented a multi-platform infrastructure allowing to use the same core program on a real robot and in simulation. The Fig. 1 shows the current state of SimSpark for SPL. This first prototype can be downloaded from our homepage³.

A special strength of this simulator is the virtual vision providing high level visual percepts (goals, ball, opponents, lines). With the virtual vision it is possible to test modeling and behavior independent of image processing. Although, the full physics of the real robot are very difficult to simulate, the simulation of high level behavior appeared to be very realistic. It makes also possible to run full games automatically, e.g., to evolve behavior or to make a test game against another team (only a binary is needed).

There is still a way to go ... Wanna help(?) Talk to us!

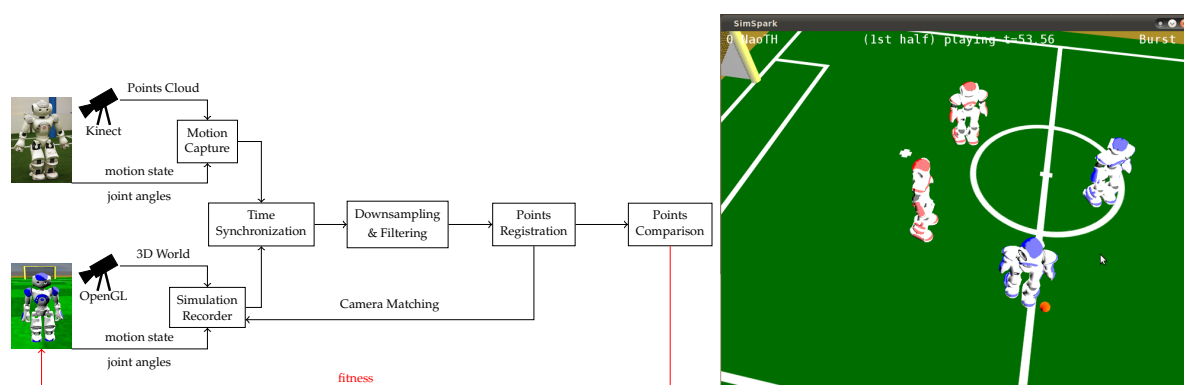


Fig. 1. Prototype of the extended SimSpark for Standard Platform League. A Kinect-based system shown on the left has been used to adjust the simulation to the real Nao. The right figure shows an SPL game simulated in SimSpark.

¹ Yuan Xu, Heinrich Mellmann and Hans-Dieter Burkhard "An Approach to Close the Gap between Simulation and Real Robots" 2nd International Conference on Simulation, Modeling and Programming for Autonomous Robots (SIMPAN), 2010

² Yuan Xu "An Approach to Close the Gap between Simulation and Real Robots" Dissertation (to appear)

³ Berlin United - NaoTH homepage: <http://naoth.de>