# Towards a Jason Infrastructure for Soccer Playing Agents*

## Extended Abstract

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**Abstract.** *AgentSpeak* and its practical interpreter *Jason* represent an excellent framework for implementing complex, reasoning agents. This paper discusses an ongoing research dedicated to extending *Jason* with the support for soccer playing agents. The end goal is to design an efficient infrastructure, capable of deploying and running *BDI* agents in the *RoboCup* soccer simulation league.

## 1 Intelligent agents playing soccer

*RoboCup* is an annual, internationally-recognized competition of football/soccer playing robots [5]. By providing a formidable challenge in a fun environment, its main goal is to support and further motivate the development of various artificial intelligence techniques.

Many concepts of the multi-agent technology, including autonomy, pro-active behaviour, coordination and cooperation, fit naturally into requirements of the *RoboCup* competition. These concepts are directly supported by the complex, *Belief-Desire-Intention* (*BDI*) agent architecture [6]. The *BDI* architecture has a strong mathematical basis and is widely supported by a number of agent development frameworks [2]. Our previous work on deploying *BDI* agents in *RoboCup* simulations [4] was based on the agent-oriented programming language *AgentSpeak* and its accompanying interpreter *Jason* [1]. The main reasons *Jason* was selected as for this task include its direct support for *BDI*, and a high level of customizability.

By analyzing the inner workings of *Jason* and the simulator, it was concluded that both systems support agents that operate in *sense-think-act* cycles. This fact simplifies the integration process significantly. To deploy *Jason* agents, it

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is sufficient to extend and modify the following set of the interpreter's subcomponents:

- *Simulated environment*: a model of the game that enables the agents to *sense* their surroundings, and *act* accordingly. The environment was extended with custom *parser* and *generator* components which, respectively, extract agent's belief literals from the simulator's set of percepts, and transform agent actions into concrete effectors;
- *Execution control*: handles *Jason* reasoning cycles. Development of a custom execution control was necessary for several reasons, including the support for *key-framed motions*. Key-framed motions often span across multiple *Jason* reasoning cycles. The execution control assures that the appropriate sets of commands are sent to the simulator as the motion progresses;
- *Agent architecture*: a link between the simulated environment and the remaining components.

Our custom implementation of these components was evaluated using a concrete implementation of a soccer playing agent [4]. The results have shown that *Jason* is perfectly capable of satisfying strict time constraints imposed by the official *RoboCup* simulator. However, further improvements and extensions are needed in order to implement and deploy agents that exhibit more complex behaviour. Our ongoing work is dedicated to designing and re-implementing the remaining parts of the *Jason* infrastructure [1]. This step is necessary in order to fully integrate *Jason* into the *RoboCup* simulator, allowing *Jason* agents to actually compete against other teams, and to do so by relying on extensively researched and well-understood concepts and methodologies of the multi-agent technology. In the long run, the plan is to further extend the infrastructure with *MOISE+*, an advanced *Jason*-compatible framework for organizational modelling that has already been tested in virtual soccer simulations [3].

## References

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