

As well as debugging, visualisation also allows the user to confirm, understand, control and/or analyse the behaviour of the system.

Visualisers of the type described below can provide means to analyse and debug such distributed control software so that the behaviours obtained are as intended by the designers. The visualiser provides a generic, customisable and scaleable visualisation system for use with a domain-independent toolkit for constructing multi-agent applications. The visualiser particularly described is generic in the sense that it could be used with any application developed using the toolkit, and customisable in the sense that it provides building blocks for constructing application specific visualisers. The scalability requirement implies it should support visualisation of systems comprising any number of agents with limited degradation in performance. The distributed nature of multi-agent applications necessarily required that the visualiser should be able to visualise remote agents across a wide area network. Further, for administrative and debugging purposes, it is important that the visualiser function both online and off-line.

In embodiments of a visualiser according to the present invention, there is provided an arrangement for analysing and locating unintended behaviours in distributed control systems, which arrangement comprises a suite of tools which all provide different viewpoints to the analysis of the distributed control software system.

All the different tools store different state data. Although no tool is capable of providing a complete analysis of the distributed system, the combination of one tool with another can. Different tools provide or suggest diagnoses. Where the evidence of one tool corroborates that from another tool, the trustworthiness in that diagnosis is increased. There is therefore a greater likelihood that the diagnosis may lead to a successful debugging of the problem. Where the evidence is conflicting, the combination of one tool with another may eliminate a hypothesis or be suggestive of other possible diagnoses.

The tools in the current CABS Visualiser/Debugging tools suite include:

- A Society Tool: which shows the interactions (messages passed) between different agents in the whole society. This includes a video type tool which is capable of recording the messages passed between different agents for later