

## Knowledge Based Behaviour Modelling and Execution in Service Robotics

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**Abstract :** In the last decade robotics research and development activities have grown rapidly, especially in the domain of service robotics. Integrating service robots into human occupied spaces such as homes, offices, hospitals, etc. has become increasingly worked upon. The primary motive is to ease daily lives of humans by taking over some of the household/office chores. However, several challenges remain in systematically integrating such systems in human shared work-spaces. In addition to sensing and indoor-navigation challenges, programmability of such systems is a major hurdle due to the fact that the potential user cannot be expected to have knowledge in robotics or similar mechatronic systems. In this paper, we propose a cognitive system for service robotics which allows non-expert users to easily model system behaviour in an underspecified manner through abstract tasks and objects associated with them. The system uses domain knowledge expressed in the form of an ontology along with logical reasoning mechanisms to infer all the missing pieces of information required for executing the tasks. Furthermore, the system is also capable of recovering from failed tasks arising due to on-line disturbances by using the knowledge base and inferring alternate methods to execute the same tasks. The system is demonstrated through a coffee fetching scenario in an office environment using a mobile robot equipped with sensors and software capabilities for autonomous navigation and human-interaction through natural language.

**Keywords :** cognitive robotics, reasoning, service robotics, task based systems

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