Toward Efficient Robot Teach-in and Semantic Process Descriptions for Small Lot Sizes

Abstract:
We present a novel robot programming methodology that is aimed at reducing the level of robotics expert knowledge needed to operate industrial robotic systems by explicitly modeling this knowledge and abstracting it from the user. Most of the current robot programming paradigms are either user-centric and fully specify the robot's task to the lowest detail (used mostly in large industrial robotic systems) or fully autonomous solutions that generate the tasks from a problem description (used often in service and personal robotics). We present an approach that is user-centric and can interpret underspecified robot tasks. Such task descriptions make the system amenable for users that are experts in a particular domain, but have limited knowledge about robotics and are thus not able to specify low-level details and instructions. Semantic models for all involved entities enable automatic reasoning about underspecified tasks and missing pieces of information. We demonstrate this approach on an industrial assembly use-case and present a preliminary evaluation—both qualitatively and quantitatively—vis-à-vis state-of-the-art solutions available from industrial robot manufacturers.

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