Abstract

In this paper an adaptive multiagent robotic assembly system is presented. State of the art industrial equipment is utilized to perform various assembly tasks in a highly unstructured environment without the need for central control. The emphasis is given to the developed methods that address particular issues in such robotic assembly systems. Close collaboration and intertwined work with human operators is one application under development, possible due to complex sensorial inputs on the robots. Active voice commands and prompts additionally contribute to human-robot interaction. Encounter with unknown objects is another issue that has been addressed and can be solved autonomously for simple case scenarios. Actual assembly applications as well as applications under development are presented. The operation in unstructured environments has been facilitated with vision systems, F/T sensors and other sensorial devices.

Keywords: Multiagent systems; robotic assembly; human-robot interaction

1. Introduction

In order to cope with current trends of dynamic changes in market demands, shortened product life cycles and large number of product changes a new approach in system design is required. Assembly technology can be stressed as one of the key factors in almost every industrial application ranging from automotive to electronic industry. A continuous development in assembly technology is present. New sophisticated tools and machines ranging from industrial robots, vision systems, handling and measuring devices have been developed [1, 2]. The level of system complexity in assembly technology is undoubtedly increasing. Functions are added to products where they never existed in the past. Technological development requires an associated development of novel system control methods. Today, utilized system control principles within industrial applications vary from simple centralized single-purpose systems to distributed flexible and adaptive systems.

A multiagent robotic assembly system is presented with embedded capabilities for adaptive behavior. State of the