Automated Test Case Generation for Industrial Control Applications

Abstract: The need for increasing flexibility of industrial automation system products leads to the trend of shifting functional behavior from hardware solutions to software components. This trend causes an increasing complexity of software components and the need for comprehensive and automated testing approaches to ensure a required (high) quality level. Nevertheless, key tasks in software testing include identifying appropriate test cases that typically require a high effort for (a) test case generation/construction and (b) test case modification in case of requirements changes. Semi-automated derivation of test cases based on models, like UML, can support test case generation. In this paper we introduce an automated test case generation approach for industrial automation applications where the test cases are specified by UML state chart diagrams. In addition we present a prototype application of the presented approach for a sorting machine. Major results showed that state charts (a) support efficient test case generation and (b) enable automated generation of test cases and code for industrial automation systems.