Generation of Single Input Change Test Sequences for Conformance Test of Programmable Logic Controllers

Abstract:
Conformance test is a functional test technique which is aiming to check whether an implementation, seen as a black-box with inputs/outputs, conforms to its specification. Numerous theoretical worthwhile results have been obtained in the domain of conformance test of finite state machines. The optimization criterion which is usually selected to build the test sequence is the minimum-length criterion. Based on experimental results, this paper focuses on the generation of a Single Input Change (SIC) test sequence from a specification model represented as a Mealy machine; such a sequence is aiming at preventing from erroneous test verdicts due to incorrect detection of synchronous input changes by the Programmable Logic Controller (PLC) under test. A method based on symbolic calculus to obtain the part of the specification that can be tested with a SIC sequence is first presented. Then, an algorithm to build the SIC test sequence is detailed; three solutions are proposed, according to the connectivity properties of the SIC-testable part.

Stichworte: Conformance test; Formal Methods; Programmable Logic Controller; Test Sequence;