Medical Cyber Physical Systems (MCPS) are life-critical, context-aware, and networked systems of software controlled medical devices, that are responsible for monitoring and controlling the physical dynamics of patient's bodies. MCPS are designed to provide high-quality continuous care for patients in complex clinical scenarios, and also thus arise various safety issues compare with the traditional medical systems. Controller software makes important decisions in MCPS, that can directly affect peoples lives and thus it is needed to validate and verify the whole MCPS system to ensure patient's safety. Although various techniques have been proposed in literature to ensure safety of MCPS, most of them follow model based simulation and do not provide any test cases for logically testing the whole systems. An automated test scenario generation approach for assisting the task of safety assurance of MCPS has been proposed in this paper. The proposed technique takes system state models as a input and extracts necessary information to generate state graph. In the next step, it extracts all possible system state transitions. And, finally generates test scenarios based on the extracted paths and stores them in text documents for the tester. The proposed technique has been applied on a
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Generic Patient Controlled Analgesia Pump Model and has been successful to generate test scenarios covering all the transitions of the state models. Thus, it automatically generates all the test cases and by testing all the paths in the system can ensure the safety of patients.

References


Index Terms

Computer Science

Information Sciences

Keywords

Medical Cyber Physical Systems, UML diagram, Test case generation, Patient