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The Methodology of System Modeling of Mechatronic Systems

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Abstract : Aims of the work: After a presentation of the functionality of an example of a mechatronic system which is a paint mixer system, we present the concepts of modeling and safe operation. This paper briefly discusses how to model and protect the functioning of a mechatronic system relying mainly on functional analysis and safe operation techniques. Methods: For the study of an example of a mechatronic system, we use methods for external functional analysis that illustrate the relationships between a mechatronic system and its external environment. Thus, we present the Safe-Structured Analysis Design Technique method (Safe-SADT) which allows the representation of a mechatronic system. A model of operating safety and automation is proposed. This model enables us to use a functional analysis technique of the mechatronic system based on the GRAFCET (Graphe Fonctionnel de Commande des Etapes et Transitions: Step Transition Function Chart) method; study of the safe operation of the mechatronic system based on the Safe-SADT method; automation of the mechatronic system based on a software tool. Results: The expected results are to propose a model and safe operation of a mechatronic system. This methodology enables us to analyze the relevance of the different models based on Safe-SADT and GRAFCET in relation to the control and monitoring functions and to study the means allowing exploiting their synergy. Conclusion: In order to propose a general model of a mechatronic system, a model of analysis, safety operation and automation of a mechatronic system has been developed. This is how we propose to validate this methodology through a case study of a paint mixer system.

Keywords : mechatronic systems, system modeling, safe operation, Safe-SADT
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