Learning Product Design Through Globally Distributed Teams: A Way to Enhance Innovation Capabilities in Mechatronics

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Creating product innovations involves the need to understand the social context in which the innovation is created and ultimately the context in which it is to be used. The use of globally distributed teams (GDTs) in engineering education to understand and enhance the social and technological interaction could catalyze the process of creating innovation. This paper proposes a framework for the analysis and support of the GDT setting. The proposed framework builds on the standardized open system interconnection model for network communication consisting of seven interconnected layers. As it has been suggested in prior studies, a successful collaboration in a GDT relies on several critical factors that build on each other. Organizing and supporting these factors in an interconnected layered scheme could better clarify the interaction between social and technological aspects. A case study of a student medical device project is analyzed using the proposed framework. The project involved students from University of Minnesota, MN and KTH Royal Institute of Technology, Stockholm, Sweden.

Fuzzy-Based Collaborative Modular Architecture for Medical Device Design and Development

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The purpose of this project is to develop a modular architecture framework for the design and manufacture of medical devices. This modular framework aims to incorporate design variables and criteria that are unique to the medical domain to facilitate reliable operation, easier maintenance, and faster product development time. Central to this research effort is the need for inputs from the range of stakeholders. The specific goals for this effort are to determine design criteria by collaborating with users and manufacturers of medical equipment and literature search, to translate user inputs to specific design targets, to develop a preliminary modular design framework using multicriteria optimization methods, and to test a preliminary modular architecture using a simple medical device such as a glucometer. The importance of the research with respect to its application in the medical arena can be very significant. With the product interaction with humans, both on the manufacturing level and the user level, the issue of safety is paramount. Some of the other significant contributions are in the improvement of the following: product quality and reliability, product life cycle issues, and an enabler for the medical community.