Mechanical Engineering Master's Defense

An Improved Framework for Design Concept Generation Based On Experiential and Intuitive Methods

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abstract

Conceptual design stage plays a significant role in product development process. Nonetheless, conceptual design stage is currently undervalued. The long term aim of this project is to develop a tool to facilitate holistic ideation for conceptual design. In previous research, we explored logical ideation methods, identified ideation states, and developed ideation strategies alleviating ideation blocks with an interactive software test bed (version 1). Next version of holistic ideation tool created a Cascading Evolutionary Morphological Charts (CEMC) framework, whereby implementing the intuitive ideation strategies (which are reframing, restructuring, random connection, and forced connection) to the holistic ideation test bed (version 2).

Despite these remarkable contributions, holistic approach (an integrated systematic approach), rather than a logical or an intuitive approach, is imperative. Therefore, the main objective of this project is to improve the framework for holistic ideation and resolve technical issues that are involved in its implementation.

The new holistic tool (version 3) integrated Mechanisms and Commercial Off-The-Shelf (COTS) with logical ideation methods. Furthermore, version 3 provided an improved CEMC framework using a web-based and user-friendly tool with an improved user interface. By doing so, users can not only come with new ideas but also effectively organize and store them in conceptual design stage. Additionally, outcome of this research can create new opportunities in research on ideation process by effectively collecting large amounts of data from designers.

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