Research Summary

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Research Work:

The primary goals of this work are to develop (i) the structure-behavior-function (SBF) models for various kinds of knowledge used by the designer during Creative Design, and (ii) the methodologies to compose different, but related, SBF models to arrive at reusable design models. We have been developing a methodology called Performance Driven Creativity (PDC) which arrives at creative designs by considering the interactions of existing design knowledge of a device and the failure knowledge of this device in a new operating environment [Prabhakar and Goel 1992]. The failure and the design knowledge are represented using different SBF models which use similar ontologies. The failure knowledge can be arrived at using (i) the previous experiences of design failures, (ii) prototypical behaviors, or (iii) basic concepts in the failure SBF model [Prabhakar 1989, Prabhakar, et al 1990]. The resulting failure knowledge represents how a fault develops, while the device performs within a new operating environment, due to the existing design knowledge. Once the failure knowledge is arrived at, it is used to discover the new constraints the known design of the device should follow. New behaviors are generated for these constraints. These behaviors are composed with the behavior of the device. Since the behaviors that realize the new constraints can be significantly different from the known behavior of the device, composition of these behaviors needs comprehension, abstraction, specification or reorganization of the concepts involved in describing the behaviors. Some of the methodologies for behavior composition have already been identified. Further work is in progress to identify and develop other methodologies.

Publications:


