World Academy of Science, Engineering and Technology
International Journal of Educational and Pedagogical Sciences
Vol:15, No:04, 2021

A Game-Based Product Modelling Environment for Non-Engineer

Authors : Guolong Zhong, Venkatesh Chennam Vijay, Ilias Oraifige

Abstract : In the last 20 years, Knowledge Based Engineering (KBE) has shown its advantages in product development in different engineering areas such as automation, mechanical, civil and aerospace engineering in terms of digital design automation and cost reduction by automating repetitive design tasks through capturing, integrating, utilising and reusing the existing knowledge required in various aspects of the product design. However, in primary design stages, the descriptive information of a product is discrete and unorganized while knowledge is in various forms instead of pure data. Thus, it is crucial to have an integrated product model which can represent the entire product information and its associated knowledge at the beginning of the product design. One of the shortcomings of the existing product models is a lack of required knowledge representation in various aspects of product design and its mapping to an interoperable schema. To overcome the limitation of the existing product model and methodologies, two key factors are considered. First, the product model must have well-defined classes that can represent the entire product information and its associated knowledge. Second, the product model needs to be represented in an interoperable schema to ensure a steady data exchange between different product modelling platforms and CAD software. This paper introduced a method to provide a general product model as a generative representation of a product, which consists of the geometry information and non-geometry information, through a product modelling framework. The proposed method for capturing the knowledge from the designers through a knowledge file provides a simple and efficient way of collecting and transferring knowledge. Further, the knowledge schema provides a clear view and format on the data that needed to be gathered in order to achieve a unified knowledge exchange between different platforms. This study used a game-based platform to make product modelling environment accessible for non-engineers. Further the paper goes on to test use case based on the proposed game-based product modelling environment to validate the effectiveness among non-engineers.

Keywords : game-based learning, knowledge based engineering, product modelling, design automation
Conference Title : ICSGGBL 2021 : International Conference on Serious Games and Game-Based Learning
Conference Location : Paris, France
Conference Dates : April 19-20, 2021