



Proceedings of the 11th International Conference on Modern Industrial Training

Modern Industrial Training and Innovative Personnel Training



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Modern Industrial Training and Innovative Personnel Training

Edited by Ding Hongsheng, Fu Tie, Xue Qing and Su Wei



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PREFACE

The International Conference on Modern Industrial Training (CMIT) was inaugurated in 1986. It serves as an international platform of academic exchange for the engineering education institutions and industries. In order for the development of engineering talent and international modern industrial training, we share views and ideas on the results of hands-on engineering education and of practical teaching, and we exchange and discuss new concepts, new pedagogies and new developments. In the past 30 years, CMITs were held successively in Guangzhou, Nanjing, Wuhan, Xi'an, Jinan, Beijing, Chongqing, Hong Kong, Nanjing and Dalian. In October 2015, the 11th CMIT, jointly organized by Beijing Institute of Technology (BIT) and The Hong Kong Polytechnic University (PolyU), will be held in Beijing, China.

The 11th CMIT will keep the objectives of the CMIT, to create an idea-exchange platform and an academic atmosphere for all participants. The theme of the 11th CMIT is "Modern Industrial Training and Innovative Personnel Training," including the following topics:

- Latest developments of engineering education and industrial training
- Future needs of human resources development for industry
- Faculty training and team building
- Training model and operation management
- Training pedagogy and assessment system
- Infrastructure building and the use of technology in engineering education
- Industry-academia partnership and international collaboration

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Finally, we wish the complete success of the 11th CMIT.

Editors October, 2015

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Session A Latest Developments of Engineering Education and Industrial Training

Advanced Computer Simulation and Visualization for Industry Training

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ABSTRACT

Advanced computer simulation and visualization have evolved to become critical emerging technologies in creating immersive virtual environments for numerous fields. The ability to allow people to "go inside" virtual environments with real conditions and computational data as well as have interactive "hands-on" experiences provides a unique, and effective tool for understanding complex physical processes. Advanced simulation and visualization technologies have shown promise to provide a virtual training tool to address the skills gap challenge in industries. Recently, the Center for Innovational Through Visualization and Simulation (CIVS) at Purdue University Calumet has developed a number of virtual training simulators which can be presented in multiple platforms such as (1) desktop virtual reality environments such as web-based "virtual tours" on an ordinary computer screen, and (2) total immersion virtual reality environments presented on multiple, roomsize screens or through a stereoscopic, head-mounted display unit. This paper will present several examples and their application to the industry training.

KEYWORDS

Computer Simulation; Industry training

1 INTRODUCTION

In the U.S. manufacturing industries, there is a critical need for skilled workers. A current "skills gap" with not enough trained workers in the job market and the aging workforce will leave a large number of skilled production technical positions unfilled. There are many causes for the skills gap, such as: 1) the poor perception of manufacturing jobs among younger workers; 2) the increasing demand for more skilled workers to operate redesigned and streamlined production lines in increasingly automated processes; and 3) the inadequate problem-solving skills and number of skills among current employees (Morrison et al., 2011).

Simulation techniques are becoming known as valuable educational tools for skills training and increasing competencies (Damassa and Sitko, 2010). Regular supervised practice in a simulated environment is generally accepted to improve skill transfer to real-world situations. Professions that benefit from training environments having a higher degree of safety and control, like various health care sectors, are turning towards computer simulations (Gaba and Raemer, 2007). Advanced computer simulations and visualization allow students to access many concepts, mechanisms, and processes that are normally unobservable and non-interactive. Students/trainees can take a more active approach to learning as opposed to just reading textbooks. Simulations also allow students/trainees to review difficult or confusing aspects of a problem as needed. There is substantial research reporting computer simulations to be an effective approach for improving students' learning.

The Center for Innovation Through Visualization and Simulation (CIVS) was established at Purdue University Calumet in 2009 and has become a globally industry-recognized innovative technical resource for integrating advanced simulation and 3D visualization for virtual design and virtual education. CIVS has developed an effective and practical methodology for the integration of advanced technologies of simulation and visualization (Moreland et al., 2015; Fu et al., 2013; Zhou, 2011; Wu et al., 2009 & 2010). The framework utilizes the unity 3D game engine