



“Gheorghe Asachi” Technical University of Iasi, Romania



MODELING AND SIMULATION OF VIRTUAL ENVIRONMENT SYSTEM OF COMPLEX COALMINE USING MULTI-AGENT TECHNOLOGY

Chaoli Tang*, Chunling Wang, Liguu Qu, Liuyi Ling

Anhui University of Science and Technology, Institute of Electrical & Information Engineering, Huainan 232001, Anhui, China

Abstract

Investigating and exploring new methods of coal-mining environment has become a new project to resolve the safety of mine production. The virtual reality technology provides new ways and ideas for the safety of mine production, and the intelligence of the virtual environment is enhanced as the multi-agent is applied. Based on multi-agent technology and the investigation of the modeling approach of the virtual environment of the complex coal mine, a three-layer architecture model and the formalization of the virtual environment of the complex coal mine were presented. The model is composed of data layer, multi-agent layer and human-machine interface layer. The model of the virtual miner with decision ability is built and is applied to the virtual environment, which is integrated with the perception, information processing, learning, behavior, planning, decision-making, and knowledge base and so on, and the model can generate lifelike personification behavior. Then, the consistency protocols of the multi-agent system of the virtual environment of the complex coal mine were analysed, and the reasons of the consistency formation of the safety operation of the multi-agent in the virtual environment were described. Finally, the control of the complex behavior of the virtual miners' agent and interactive simulation of multi-agent in the coalmine virtual environment were realized in PC using the object-oriented technology. The research in this paper has important significance to safe production of mine, the relevant research achievements can be applied to other mining areas such as non-ferrous, metallurgy and so on.

Key words: coalmine virtual environment (CMVE); consistency; multi-agent; virtual simulation

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* Author to whom all correspondence should be addressed: E-mail: chaolitang@163.com; Phone: +86554 6668687; Fax: +86554 6668687