·Editorial·

# VR and experiment simulation

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In this special issue, the theme is on the application of VR/AR to experiments and training. We include 7 papers which can be divided into two sets, one on specific virtual experiments covering chemistry and biology, the other on the supporting techniques for VR experiments.

For the first topic, in the first paper by Mengting XIAO et al., they present the multimodal interaction design techniques, which are applied in augmented reality for chemical experiment. The system can achieve real-time fusion of the gesture, virtual model, and intelligent equipment,which improves the users' real sense of operation and interaction efficiency. In the second paper by Hengwei XU et al., the authors construct a virtual chemistry experiment temperature simulation platform, based on which a wearable temperature generation device is developed. The platform is capable to indicate near real-world experimental situations. In the third paper by Xiang ZHOU et al., a technology-aided biological microscope learning system based on VR/AR is presented. The structure of the microscope is described in a detailed three-dimensional (3D) model, each component being represented with their topological interrelationships and associations among them being established.

For the second topic, in the first paper by TJ MATTHEWS et al., the paper conducted a usability study of an in-use emergency medicine VR training application, available on commercially available VR hardware and with a standard interaction design. In the second paper by Rui HAN et al., an experimental navigation system based on multi-mode fusion is proposed. The system first obtains user information by sensing the hardware devices, intelligently perceives the user intention and progress of the experiment according to the information acquired, and finally carries out a multi-modal intelligent navigation process for users. In the third paper by Yuxiang ZHAO et al., A virtual simulation of the design and manufacture of a beer bottle-defect detection system was implemented, which will not only help the students to increase their image-processing knowledge, but also improve their ability to solve complex engineering problems and design complex systems. In the fourth paper by Hongxin ZHANG et al., the authors design a cloud-to-end rendering and storage system for VR experimental education comprising two models: background and interactive. The cloud server renders items in the background and sends the results to an end terminal in a video stream. Interactive models are then lightweight-rendered and blended at the end terminal. An improved 3D warping and hole-filling algorithm is also proposed to improve image quality when the user's viewpoint changes.

As the guest editors, we would like to thanks all the contributors and the reviewers for these papers, we hope the special issue will have good reference value to related work.

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