

# Introduction



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**Abstract** This book is our continuous effort (Cai in 3D Immersive and interactive learning. Springer, Berlin, 2012; Cai and Goei in Simulation, serious games and their applications. Springer, Berlin, 2014; Cai et al. in Simulation and serious games in education. Springer, Berlin, 2016) to promote simulation and serious gaming. The eleven chapters book presents a multi-facet view of simulation and serious games for educational applications from STEM to Special Needs. Virtual Reality is one of the emphases in this book.

## 1 Background

In 2012, the first Asia-Europe Symposium on Simulation and Serious Games was held at Nanyang Technological University, Singapore. Best papers selected from the symposium were published in a book *Simulation, Serious Games and Their Applications* by Springer (Cai and Goei 2014). The second version of Europe-Asia Symposium on Simulation and Serious Games was held at Windesheim University of Applied Sciences, The Netherlands, in 2014. A book entitled *Simulation and Serious Games in Education* based on the selected papers from the 2014 symposium was published by Springer (Cai et al. 2016). The third version of Asia-Europe Symposium on Simulation and Serious Games was held in Beijing Normal University at Zuhai in 2016 as part of the 2016 ACM SIGGRAPH International Conference on

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**Fig. 1** The 2016 Asia-Europe Symposium on Simulation and Serious Games as part of the ACM SIGGRAPH VRCAI 2016 Conference

Virtual-Reality Continuum and Applications in Industry (VRCAI 2016) (see, Fig. 1) (Cai and Thalmann 2016). Partially based on the 2016 symposium, this new book is devoted to Virtual Reality, Simulation and Serious Games in Education. For those best papers selected from the symposium presentation, substantial enhancements are made before they are accepted as book chapters in the new book.

## 2 About the Book

This book has eleven chapters organized as follows.

This chapter is an introduction by the book editors Yiyu Cai, Wouter van Joolingen and Zachary Walker. In Chap. 2, Veermans and Jaakkola will share their work on design considerations for educational simulations and games. In Chap. 3, Anne van der Linden and Wouter van Joolingen will present their work using a serious game supporting conceptual change in mechanics. In Chap. 4, Casano et al. will describe the evaluation of a re-designed framework for embodied cognition math games. In Chap. 5, Ryan et al. will elaborate their research on the use of virtual & augmented reality technology to enhance the learning and understanding of biological molecules. In Chap. 6, Wu and Zheng will discuss their study on autism education through motion sensing based gaming. In Chap. 7, Yang et al. will investigate vehicle behaviours simulation technology based on neural network. In Chap. 8, Liang et al. will showcase their multi-player, and cross-platform competitive social game BlockTower. In Chap. 9, Hovardas and Zacharia will discuss an inquiry-based approach for learning system dynamics and modeling of the prey-predator system. In Chap. 10, Siti et al. will report their research and development on VR Serious Game

for Special Needs Education. In Chap. 11, Xie et al. will describe Virtual Reality Simulation for Engine Disassembly with Natural Hand-Based Interaction.

Researchers and developers in Simulation and Serious Games for educational use will benefit from this book. Training professionals and educators can also benefit from this book by learning the possible applications of Virtual Reality, Simulation and Serious Games in various areas.

## References

- Cai, Y., & Thalmann, D. (2016). The 3rd Asia-Europe symposium on simulation & serious gaming. In *Proceeding of the ACM SIGGRAPH Conference on Virtual-Reality Continuum and Applications in Industry*, Zhuhai, China, December 03–04, 2016.
- Cai, Y. (Ed.). (2012). *3D immersive and interactive learning*. Berlin: Springer.
- Cai, Y., & Goei, S. L. (Eds.). (2014). *Simulation, serious games and their applications*. Berlin: Springer.
- Cai, Y., Goei, S. L., & Trooster, W. (Eds.). (2016). *Simulation, serious games in education*. Berlin: Springer.