Virtual Reality

Virtual Reality in the Medical Domain



Introduction

Jan Egger, Markus Gall, Jürgen Wallner, Zhaodi Deng Pedro Boechat de Almeida Germano, Alexander Hann, Xing Li Xiaojun Chen, Knut Reinbacher, Katja Schwenzer-Zimmerer Dieter Schmalstieg

Graz University of Technology, Institute for Computer Graphics and Vision, Graz Austria

Medical University of Graz, Department of Oral and Maxillofacial Surgery, Graz, Austria

Virtual Reality (VR)

Immersive computer technology

•Replicates an environment via computer-simulated reality

Methods

Importing medical data into virtual reality

•Integrated the OpenVR library into MeVisLab

•Direct and uncomplicated usage of head mounted displays

•Providing a convenient graphical interface to the user

Ulm University, Department of Internal Medicine I, Ulm, Germany Shanghai Jiao Tong University, School of Mechanical Engineering, Shanghai, China BioTechMed-Graz, Graz, Austria Saint-cc, Shenzhen, China

Medical Applications

Complex surgical interventions

•Facial or head and neck surgeries

•Planning, simulation and training with the HTC Vice

•Precise aesthetic outcome

References

1. Schmalstieg, D. & Höllerer, T. Augmented Reality: Principles and Practice. Addison-Wesley Professional; 1st ed., Paperback, 528 pages, ISBN 978-0321883575 (2016). 2. McCloy, R. & Stone, R. Virtual reality in surgery. BMJ. 323(7318):912-915 (2001).

3. Cha, Y. W. et al. Immersive Learning Experiences for Surgical Procedures. Stud Health Technol Inform. 220:55-62 (2016).

4. Egger, J. et al. Integration of the OpenIGTlink network protocol for image guided therapy with the medical platform MeVisLab. The international Journal of medical Robotics and Computer assisted Surgery, 8(3):282-390 (2012).

5. Gall, M., et al. Computer-Aided Planning and Reconstruction of Cranial 3D Implants. IEEE Engineering in Medicine and Biology Society (EMBC'16), Orlando, FL, USA, pp. 1179-1183 (2016).

6. Li, X. et al. A semi-automatic implant design method for cranial defect restoration. Int J CARS 11 (Suppl 1):S241-S243, Heidelberg, Germany (2016).

7. Vogelreiter, P. et al. Global Illumination Rendering for High-Quality Volume Visualization in the Medical Domain. Face 2 Face – Science meets Arts, Medical University of Graz, Department of Maxillofacial Surgery (2015).

8. Chen, X. et al. Development of a surgical navigation system based on augmented reality using an optical see-through head-mounted display. J Biomed Inform. 55:124-31 (2015).

Acknowledgements

The work received funding from BioTechMed-Graz in Austria ("Hardware accelerated intelligent medical imaging") and the 6th Call of the Initial Funding Program from the Research & Technology House (F&T-Haus) at the Graz University of Technology (PI: Dr. Dr. Xiaojun Chen receives support by the Natural Science Foundation of China (Grant No.: 81511130089) and the Foundation of Science and Technology Commission of Shanghai Municipality (Grants No.: 14441901002, 15510722200 and 16441908400).

September, 30th 2016, Friday and October, 1st 2016, Saturday, Medical University of Graz, Hörsaalzentrum, Austria.

