Next generation 3D Virtual Human Anatomy Laboratory, using off-the-shelf hardware and software

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Abstract

Introduction: Since 2013, we have built a 3D Virtual Dissection Laboratory, at the Human Anatomy Department of our University. The laboratory includes off-the-shelf hardware and Free/Open Source Software: an advanced 2D virtual dissection table, based on multitouch (50+ touchpoints) and a 3D display matrix, using passive 3D glasses. For the software, we have used various Free/Open Source Software for Virtual Anatomy. Thus, even today, this lab is one of the most advanced 3D virtual dissection lab in the World. But, it is only one such virtual lab in our University, clearly insufficient for the needs of our thousands students. Because of these reasons our next goal was to develop a virtual dissection lab ready to be used on regular smartphones (Android and/or IOS OS), thus being available to every student who owns such off-the-shelf hardware. Materials and methods: For the development we have used some regular Android smartphones and Bluestacks Android emulator for Windows (www.bluestacks.com). The 3D files for Human Anatomy were reconstructed by us from various Free/Open Source Software and Libraries dedicated to Human Anatomy. *Results:* The reconstructed 3D anatomical models for Human Anatomy were afterwards incapsulated in a 3D PDF file, ready to be opened using the free 3D PDF reader, available on Google Play or Apple Store. That reader is able to provide a 3D virtual working environment for the users, that includes: ① Selection/Reveal or Hiding of a specific Human organ and/or system, single or together with other related anatomical structures; ② Dissection of the Human Body and/or anatomical structures, on X, Y or Z (3D) coordinates; and ③ Possibility of saving a specific Virtual Dissection session, using screen capture utilities available on Android Smartphone, etc. *Conclusion:* Our research and development have clearly demonstrated the possibility to provide and run a Next-Generation Virtual Dissection Lab using off-the-shelf hardware (Android smartphones), a 3D PDF reader and Human Anatomy models developed on-site by us.

Keywords:
Virtual anatomy; Virtual 3D dissection; Off-the-shelf hardware; 3D PDF