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Article Title: Motion detection technology as a tool for cardiopulmonary resuscitation (CPR) quality improvement

Year of publication: 2011

Link to published article:

<http://dx.doi.org/10.1016/j.resuscitation.2011.07.043>

Publisher statement: "NOTICE: this is the author's version of a work that was accepted for publication in Resuscitation. Changes resulting from the publishing process, such as peer review, editing, corrections, structural formatting, and other quality control mechanisms may not be reflected in this document. Changes may have been made to this work since it was submitted for publication. A definitive version was subsequently published in Resuscitation, VOL: 83, ISSUE: 1, January 2012, DOI: 10.1016/j.resuscitation.2011.07.043 "

Motion detection technology as a tool for cardiopulmonary resuscitation (CPR) quality improvement

The most popular method of training in basic life support and AED remains instructor-led training courses. Recent reviews provide good evidence to support alternative methods of training including lay instructors, self-directed learning (web, video, poster) and CPR feedback / prompt devices.^{1,2} We report here the results of the prototype testing of the previously described Mini-VREM project.³ In brief we used the Kinect[®] sensor system to monitor the performance of CPR on a manikin. Kinect[®] is a motion sensing input device made by Microsoft for the Xbox 360 game console. It enables users to control and interact with the Xbox 360. It does this through a natural user interface which recognises gestures and spoken commands without the need to touch a game controller. Kinect's camera is driven by both hardware and software. It does two things: it generates a three-dimensional image of the objects in its field of view and recognises human beings among those objects. The camera transmits invisible near-infrared light and works like sonar. At this point, both the Kinect's hardware — its camera and IR-light projector — and its firmware called "middleware" are operating. The Kinect[®] has an on-board processor which uses algorithms to process the data to render the three-dimensional image. The middleware can distinguish human body parts, joints and movements, as well as distinguishing individual human faces from one another. The Kinect[®] sensor can detect objects within a working distance of 1.2–3.5 m. The horizontal field of the Kinect[®] sensor is 87 cm, and the vertical field is 63 cm, resulting in a resolution of just over 1.3 mm (0.051 in) per pixel. With this technology, Kinect[®] can distinguish objects depth within 1 cm and their height and width within 3 mm. This resolution is sufficient for quality CPR analysis (chest compression rate and depth). Recently, Microsoft released a non-commercial Kinect[®] software development kit (SDK) for Windows. It enables the academic and enthusiast communities easy access to the capabilities offered by the Microsoft Kinect[®] device connected to computers running the Windows 7 operating system.⁴ Our preliminary tests demonstrate the feasibility of the Kinect[®] sensor to monitor CPR performance and can be viewed on U-tube.⁵ Kinect[®] was able to reproducibly track limb movement during external chest compression and demonstrated excellent synchrony with simultaneous video recordings. We are now looking for experienced developers willing to collaborate in this project. Further research and technology development is needed to understand if Kinect[®] will be able to measure quality CPR data.

Conflict of interest

None to declare.

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Birmingham, 13th July 2011