

Augmented Reality Training Kit Can Offer Novel Teaching Solution For Future Cardiac Surgery And Other Medical Professionals

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Abstract

There has been considerable rise in cardiovascular diseases like coronary artery disease and valvular heart disease in developing countries all over the world. This has also lead to increase in complications like atrial fibrillation. Surgical treatment is one of the optimum mode of management of these diseases when medical and other interventional methods fail. Traditional surgical procedures involve opening of the Chest through the sternum and connecting the patients on to Cardiopulmonary bypass machine and arresting the heart. The surgical techniques are then performed on arrested heart. But these techniques can lead to additional morbidity in that these provoke Central nervous system disturbances and also gastro intestinal complications in few patients.

These complications multiply in obese patients and also in elderly patients. Minimally invasive surgery offers a better option to these patients. However, currently there are some limitations to the use of these techniques. Inadequate safe and effective training systems are on the reasons. Computer assisted technologies like augmented training can offer a viable option. The benefits of using this system of training is that it offers a real life like training in a simulated environment with the ability to simulate potential complications.

CONFLICT OF INTEREST

Rahul Shetty is the founder of Mezocore Technologies Inc, an early stage biomedical venture. This is planning to develop a virtual medical education training solution system. The main area of application is for optimum training of medical students and medical professionals.

DISCUSSION

Coronary artery disease is the most common cause of death in the developed world. Although not as deadly, atrial fibrillation is also a dangerous condition, accounting for approximately a five to Sevenfold increase in stroke risk and a doubling of mortality from cardiovascular disease [1]

Cardiac Surgery is one of the available treatment modalities for patients seriously suffering from cardiovascular diseases when medical therapy has failed. This is also reserved for patients who present with various complications such as atrial fibrillation. Approach to the heart is traditionally achieved through opening of the chest, arresting the heart, and placing it on cardiopulmonary bypass. These highly

invasive methods result in additional patient trauma, leading to longer hospital stays and costs compared to less invasive approaches [2]

Minimally invasive Cardiac Surgery is one of the options for treating patients requiring open Heart Surgery, However, Current minimally invasive techniques for beating heart surgery are associated with three major limitations: the shortage of realistic and safe training methods, the process of selecting port locations for optimal target coverage from X-rays and angiograms, and the sole use of the endoscope for instrument navigation in a dynamic and confined 3D environment [3]

Computer assisted training plays an increasingly important role in Medical Education. Computer aided technology can help information to be displayed in a real life like situation, but in a simulated environment. This has been used in training of Air pilots through the use of Flight Simulators. This method can be adopted in training of future medical professionals in area of Cardiovascular surgery and other

medical specialties.

Although various commercial kits are currently available training of endoscopic and laparoscopic surgical techniques, many of them lack the immersive experience and also the ability to simulate complications which can arise in real life situations. [4,5].

These solutions which are currently offered are also very expensive, thereby preventing the optimum utilization by many medical centers. There is need for development of low cost training solutions which offers not only an immersive experience similar to that seen in real life situations but also is cost effective. Unlike the current training kits, augmented reality can be a step further with offering of real life like training environment.

The rapid growth of computer industry in the couple of years has decreased the cost of these systems while improving the performance of the processors.

The training Solutions could consist of a high resolution display screen with touch screen functions. A processor which drives the needed surgical training software. The processor could be the one currently available in the market with a higher speed in computing (more than 3-4 GHz) using dual processors for optimum functioning of animations .A video graphics memory card of about (2GB).This should be able to provide 45 Million polygons per second. The device could offer a video gaming like experience thereby enabling users to simulate different complications. The most important element useful in offering a complete immersive experience will be the use of a Haptic Device, a glove like device, with multiple sensors imbedded which acts as an

interface between the user and the computer. This provides the touch and feel of the tissues as in real life.

Augmented reality may not be a new idea, but the current technology is either substantially high priced or inadequate in offering real life training solution (and often both).The future will be good if serious consideration is given in developing augmented reality training Solutions for Medical professionals and Medical Students.

This will not only enable better training of future medical professionals but also reduce the cost of training with ultimate benefit to the patients.

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References

1. Gillinov, A.M., Blackstone, E.H., McCarthy, P.M., Atrial fibrillation: current surgical options and their assessment. Ann. Thorac. Surg. 74,2002., 2210-2217.
2. King, R.C., Reece, T.B., Hurst, J.L., Shockley, K.S., Tribble, C.G., Spotnitz, W.D., Kron, I.L., 1997. Minimally invasive coronary artery bypass grafting decreases hospital stay and cost. Ann. Surg. 225, 6, 805-811.
3. Marcin Wierzbicki , Maria Drangova , Gerard Guiraudon , Terry Peters .Validation of dynamic heart models obtained using non-linear registration for virtual reality training, planning, and guidance of minimally invasive cardiac surgeries. Medical Image Analysis 8 ,2004,387-401
4. Pimentel, K. & Teixeira, K. Virtual Reality Through the New Looking Glass. Intel/Windcrest/McGraw-Hill, 1992.
5. Rheingold, H. Virtual Reality. New York, NY:Summit Books, 1991.

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