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Paper:

Thomas, D. Augmented Reality in Surgery: The Computer-Aided Medicine Revolution. *International Journal of Surgery*

http://dx.doi.org/10.1016/j.ijsu.2016.10.003

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Accepted Manuscript

Augmented Reality in Surgery: The Computer-Aided Medicine Revolution

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To the Editor:

The 21st Century medical environment is a complex operating environment. The integration of information technology in the medical sector offers the evolution in information-focused healthcare, which can potentially lead to a revolution in patient treatment. The NHS has truly embraced and integrated information technology into all parts of its service. From patient record data, which are now stored electronically. To the potential use of Artificial Intelligence (AI) technology such as that of DeepMind envisaged by google which is planned to be able to directly be able to analyse huge amounts of patient and operational healthcare data. We are now entering into an exciting dawn and the powerful landscape of computer-aided medicine.

In the most fundamental of forms, using computer systems to sift through huge datasets to establish patterns could offer a vital proving ground before its progression into other vital areas. This would lead not just towards the conventional yet vital applications of managing bed space and medication tracking. But this powerful partnership could evolve to identify patterns in degenerative diseases, detect and track ward infection trends and could help the NHS in minimising outbreaks of disease.

Also among the most useful possibilities is in reading medical images and integrating this information to be used in the vital services. This remains to be most powerful near-term potential for everyday medicine. Although the complexity of modern-day medicine is now becoming increasingly difficult. Can we bring all of this information directly to the hands of the medical professional during everyday life to lend a digital hand?

The first current glimpse into this approach is through the use of Augmented Reality Interfaces (ARI) which remains to be the next frontier in on-demand information lead medicine. This can allow for the different elements in the digital medicine landscape to be integrated together. The efficient use of data to become interactive 3D information can be directly used towards enhancing medical outcomes. The next stepping stone is on towards integrating augmented reality devices for the purpose of the presentation of real time information.

During the preoperative phase of a procedure, the surgeons will have a mental image of what needs to be carried out. Marking structures of interest on radiographic images that can be superimposed on live video camera images allows a surgeon to simultaneously visualise the surgical site and the overlaid graphic images, creating a so-called semi-immersive environment.

ARI offers a revolutionary and dynamic approach towards aiding the execution of complex surgical procures and can even assist in medical diagnosis. ARI techniques have been tested and successfully validated in cardiovascular surgical procedures. The goal of improving repairs to the heart mitral valves and replacement of aortic valves more efficiently.

At the current rate of evolution on innovative technologies augmented reality is pitted to become a critical and useful tool in the operating room. ARI offers the following integrated systems:

- Precision multi-axis motion sensing

- High definition integrative displays

- Data handling capability

- Speech recognition

It is important to note that ARI devices include speech recognition technology. This form of non-contact control is vital because it is the most rapid means of accessing information, which does not require any necessary physical contact.

Earlier this year the NHS encouraged virtual blood donations with augmented reality outdoor ads via smart phone integration.

tumour models onto live video images. This has enabled surgeons to see the exact position in three-dimensional space of tumours as if they were visible through the skin.

Although its application is in a preliminary stage, further research is needed to evaluate its long-term clinical impact on patients and surgeons. We have only really scratched the surface of what augmented reality is capable of in the hospital. Other variables such as graphics quality, processing power, software durability and dynamic object tracking will become important critical factors for the advancement of augmented reality in the medical world.

These new information lead technologies for medical assistance offers significant potential. The amalgamation of medical data to form real time information can provide vital knowledge to those who need it, when they need it. Although modern healthcare is a multifaceted complex field, there is significant influence that information-lead technologies can lead towards. The integration of key technologies and their incorporation into a range of healthcare application has potential to revolutionise and enhance treatment for a new era.