“One of the definition of sanity is the ability to tell real from unreal. Soon we’ll need a new definition.”

- Alvin Toffler (American writer and futurist)

“Reality is merely an illusion, although a very persistent one.”

- Albert Einstein (German born American physicist)
SEMINAR ON VIRTUAL SURGERY

PRESENTED BY:
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INTRODUCTION

- Virtual surgery means a virtual reality simulation of surgical procedures.
- Simulation means assumption of a false appearance.
- These simulations are used to practice dangerous surgical procedures without the need of an actual patient.
- The virtual reality simulation is used as an imagination for the actual surgery where doctors can practice on a virtual patient before performing the surgery.
HISTORY AND DEVELOPMENT

• The term virtual surgery was coined by JARON LANIER in 1980’s.
• Since the VS system has undergone a tremendous change in terms of usage and adaptability. The oldest virtual surgery lab has been situated in Oregon State Medical University which was set up in 1990.
NEED OF VIRTUAL SURGERY:
**With the cadaver becoming a rarity and being considered unethical and impractical the virtual surgery system holds a great promise.
**With these kind of systems surgery residents can perform a particular kind of surgery for a zillionth time without the need of an actual patient.
**As this system shows and also points out mistakes, the aspiring surgeons can always learn from their mistakes.
WHY BETTER THAN TRADITIONAL SYSTEM:

**As the touch enabled simulators used in virtual surgery system allow users to practice their skills on computers without the use of costly cadavers, it’s quite cost effective.**

**With the use of force feedback system these systems combine the visual and factual information with a sense of touch; which gives the feel of operating on alive patient.**

**Research by Yale university medical professional shows that surgeons trained with virtual surgery perform 24 pc faster than ordinary surgeons.**
Virtual surgery technology
In details

The virtual surgery works, when the patient come in for procedure, they get scanned and a 3D dimensional double is generated

• With processes like MRI scan, CT scan the process of making a virtual double of you starts.
• Then after using processes like VR environment and simulation the process proceeds.
• Then taking standard human measurements of male/female body the simulated image is brought to life.
• Various complex softwares, Realtime fluid dynamics theory and SensAble pvt. technology’s GHOST softwares are needed to move into the final image.
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VIRTUAL REALITY:
**Virtual reality is a generalization of the standard visual simulation paradigm where the model and actions used in the simulated world are extracted from various sensors and information retrieval system. The resulting visual simulation aims at an exact representation of the real world.**
**With VR space we can navigate, interact, immerse, and feel the presence of the actual material world.**
**It reduces the need of physical prototype and improves product ergonomics and functionality.**
**And the most appealing part is that it can present everything in three dimensions.**
Example:-

- Simulation of a surgical operation on the liver.
- Interaction with a deformable model of the liver using virtual surgery technology.
FORCE FEEDBACK SYSTEM:
**These force feedback systems provide the user the same resistance or reaction from the VR environment as it would have provided in an actual environment.**
**Otherwise known as haptic devices; these are commercially produced by PHANTOM pvt.limited, USA.**
**The haptic devices offer higher fidelity, stronger forces and lower friction to the practising surgeons.*
**Without these force feedback systems the virtual surgery program would have become just like a videogame.**
**These devices reproduce the feeling of moving and manipulating the surgical tools within the patient’s anatomy and the flexibility to tailor the tactile experience.**
**Taking the example of use of virtual surgery in minimally invasive surgeries the surgeons have succeeded in critical laparoscopic surgeries. **
**Pediatricians now a days are more dependent on these virtual surgery system as their infant or newborn patients are not likely to visit the hospital more often. **
COMMERCIALY AVAILABLE SIMULATORS :
1. XITACT
2. LAPSIM
3. REACHIN
4. VEST
5. MIST-VR
6. SurgSim
APPLICATIONS IN VIRTUAL SURGERY

Virtual surgery application is subdivided as follows:-

• TRAINING AND EDUCATION
• SURGICAL PLANNING
• IMAGE GUIDANCE
• TELESURGERY
• There are many striking similarities between pilots and surgeons.
• They are always ready to manage life threatening situation in an unpredictable environments very dynamically.
• The surgeons used to follow text book images or cadavers for the training purposes.
• Today cadavers are limited in supply and generally allowing one time use only, so this virtual surgery technology is becoming a training method of choices in most medical school.
• These virtual reality models enable the user to perform a procedure countless times which help the surgeon to strip away various layer of tissue and muscles to examine each organ separately, which result in a error less surgery.
SURGICAL PLANNING

• Tradition wise the surgery was planned, the surgeon inculcated the various parameter and procedure for surgery which he is calculated from his earlier experiment.
• He did not have exact idea how the surgery was going to result which led to lots of errors and risking of the human life.
• This virtual surgery technology helped in reducing these errors and to plan the surgery in most efficient and reliable manner.
IMAGE GUIDANCE

• The integration of advance imaging technology, image processing and 3D graphical capabilities has led to great interest in image guided and computer aided surgery.
• This technique has been proved useful in robotic surgery.
TELE-SURGERY

- Tele-surgery allows surgeons to operate on people who are physically separated from themselves.
- This is usually done through a master slave robot.
- The surgeon relies on a 3D virtual representation of the patient and benefit afforded by the robotic apparatus.
HOW IT HELPS IMMENSELY

• The main advantages of virtual surgery in surgery are: Intelligent computer backup, minimises no of medical mistakes.
• It is interactive in nature, the presence of a instructor is not necessary.
• It gives better training.
• Surgeons can practice operations multiple time without the use of cadavers or animals.
• Surgeons can easily interact with several organs.
ACHILLES’ HEEL:

- The surgeon should never give up his dexterity.
- A lot of marketing and funding should be allocated for the betterment of this noble project which will ultimately help mankind.
CONCLUSION

• Medical virtual surgery has a long way to go in the coming era.
• The use of computer aided and image guided technique has helped a lot in the advancement of medical science.

IN ALL AND IN SHORT, THE VIRTUAL SURGERY IS A CHEAPER ALTERNATIVE TO CADAVER AND A SAFER ALTERNATIVE TO PATIENT.
THANKS A LOT FOR BEING IN THIS VIRTUAL ENVIRONMENT............
3 Idiots

\[ x^2 + y^2 = (x_1 + x_2)^2 \]

\[ x + y = \sqrt{x_1 + x_2} \]

\[ F(x) = 1 \]

\[ y = x^2 + 1 \]

\[ a \]
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