Service Priorities and Programmes

Electronic Presentations

Convention ID: 1152
Submitting author: Dr Carrison Ka Shun Tong
Post title: Physicist, Pamela Youde Nethersole Eastern Hospital, NULL

Medical Modelling for Multidisciplinary Trainings in Minimal Access Surgery And Clinical Simulation Training Centres

Tong CKS(1), Ho CW(2), Tang KK(3), Yan WW(4), Fan CW(2), Tang CN(2)
(1)Medical Physics Department (2)Department of Surgery (3)Department of Obstetrics & Gynaecology (4) Department of Intensive Care, Pamela Youde Nethersole Eastern Hospital

Keywords:
3D Printing
clinical
simulation
training
medical
medical

Introduction

Clinical training is import for medical professions including doctors, nurses. Traditionally, clinical trainings were performed using dead animals or live patients. Dead animals cannot provide the necessary pressure, blood flow, patient movement and response for the medical professions. Training on a live patient is too risk both for patients and the trainees. In Pamela Youde Nethersole Eastern Hospital (PYNEH) Minimal Access Surgery Training Centre (MASTC) and Clinical Simulation Training Centre (CSTC), clinical trainings were provided in a simulated environment for doctors and nurses in various specialties.

Objectives

The objective of this project is to build simulated environments composed of different high quality medical models using 3D Reconstruction, 3D Modelling, 3D Printing and Silicon Casting techniques for users from various specialties including Wound Management, Intensive Care Unit (ICU), Gynecology, and Urology. The models built have similar stiffness, hardness, colour, shape, and size as the original organs. This simulated environment provided a safe, clean, and realistic training for users from different specialties.

Methodology

In simulation training environment consisted of two major parts: high quality human organ model, and device. The high quality human organ model was created using the Computed Tomography (CT) or Magnetic Resonance (MR) images of selected patients. The acquired images stored in Digital Imaging and Communications in Medicine (Dicom) format were processed by a 3D Reconstruction technique called Marching Cube image processing technique to create a high quality 3D Reconstructed model in STereoLithography (STL) format. The 3D model was edited

by some 3D graphics software such as Blender or Meshmixer. The editing were including smoothing, sculpting, painting, adding, subtracting, mirroring, and remeshing. The result of editing were negative models for the organ were created which were ready for 3D Printing. Most of 3D printers only accept holes-filled STL files. The holes-filled STL files were printed by a 3D Printer. Finally, silicon gel mixed with colour dye were injected into the printed negative model to create the silicon models. The casted silicon model were fixed into a fabricated device to form the simulated environment for clinical training.

Result

In 2015, a number of simulation training workshops were conducted in PYNEH using the above medical modelling techniques. The created simulated environment provided a safe, clean, and realistic training for users from different specialties.