4nd International Conference on
Advances in 3D Printing & Modelling
April 15-16, 2019 | Amsterdam, Netherlands



3D printed patient-specific knee phantom for educational purposes and surgical planning

Author (s) Name: Miguel Gomez Martin, Javier Pascau
Universidad Carlos III de Madrid, Spain, Europe

Everyone seeks for the best treatment and care possible when they go to the hospital with reduced costs. This is one of the main concerns people have nowadays and what refrain them from going to the hospital for routine checkups. Therefore, there exist an international effort for bringing down clinical costs and taking excellent medical care to everyone regardless of their economic status. So, this project looks for new ways of making that possible.
We show an innovative way of reducing Operating Room time and increasing doctor's performance. We plan to do that by developing a knee phantom from the study and analysis of CT and MRI images, that will help doctors plan surgeries beforehand by being able to explore the anatomy of patient more thoughtfully and also be of great use for medical student to practice surgical procedures. The imaging scans were analysed using the software 3D Slicer and consequently segmented using the different built-in tools of the software.
Later, 3D printing techniques like Fused Deposition Modelling and Stereolithography were used along with its corresponging materials (elastic and solid ones) to produce the model. Different software tools like 3D Slicer, Meshmixer, Horos and Cura were also implemented for the final design and rendering of the phantom. A final study of the flexion/extension and rotative properties of the knee phantom was performed using a self-developed interface in 3D Slicer and MARG sensors accelerometers. And the results were compared to those perfomed in industrial prosthesis in cadavers.

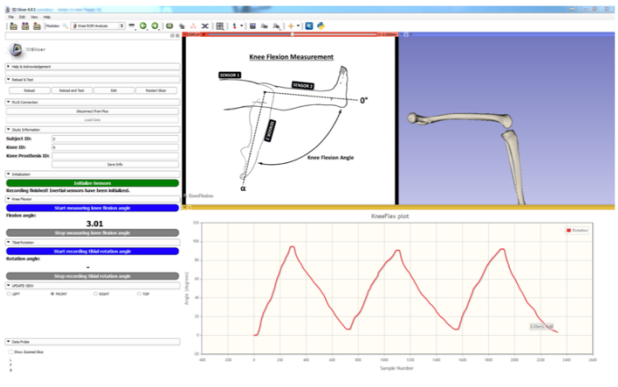


Figure 1: Shows the 3D Slicer interface for measuring bending properties. Tibial rotation.



Figure 2: Shows the resulting 3D models after applying the silicon paste (left) and the ensembled klnee phantom after being 3D printed

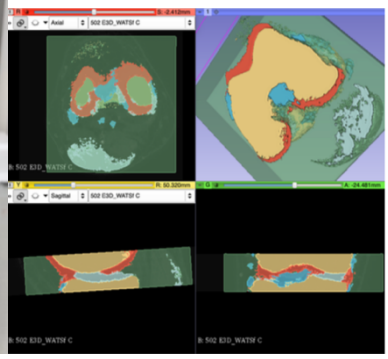


Figure 3: Shows the 3D Slicer interface for segmenting and producing the ed model from the CT and MRI scans

Biography

Miguel Gomez Martin has developed this project upon completion of his bachelor degree in Biomedical Engineering from Universidad Carlos III de Madrid under the supervision of Prof. Javier

Pascau. Javier Pascau is the Head of the department of Biomedical Engineering at Universidad Carlos III de Madrid and this project was undertaken with the active collaboration of Dr. Ruben Perez-Mañanes at Hospital General Unviesitario Gregorio Marañon, a premier healthcare research organization. Javier Pascau and Dr. Ruben has published a great amount of papers in reputed journals.

Presenting author details
Full name: Miguel Gomez Martin
Contact number: +34 603392186
Email id: miguelgmartin1@gmail.com
Category: Oral presentation
Session name: 3D Printing in the Clinical Environment
Research interest: Medical 3D Printing