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Engineering
EyobuNjineli
Ingenieurswese



Dr Rudolph G Venter

Institute for Biomedical Engineering (IBE)

Industry Showcase 2025

Biomedical Engineering Innovations for Africa

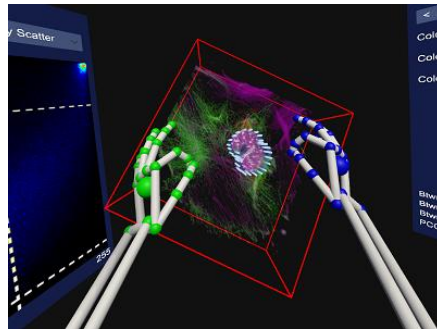
What is the IBE?

- Multidisciplinary focus on Biomedical Engineering
- Collaborative research
- Across faculties
- Multidisciplinary degree offers
 - MEngSc (Biomedical Engineering) – **Structured**
 - MEngSc (Biomedical Engineering) – **Research**
 - PhD (Biomedical Engineering)

} Research degrees are co-supervised between faculties



Biosensors



Virtual Reality Cell Analysis Tool

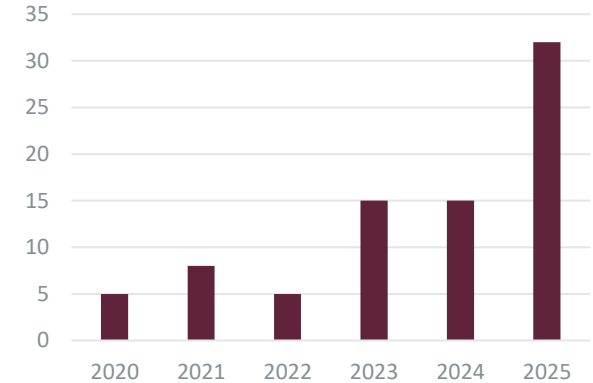


Medical 3D Printing

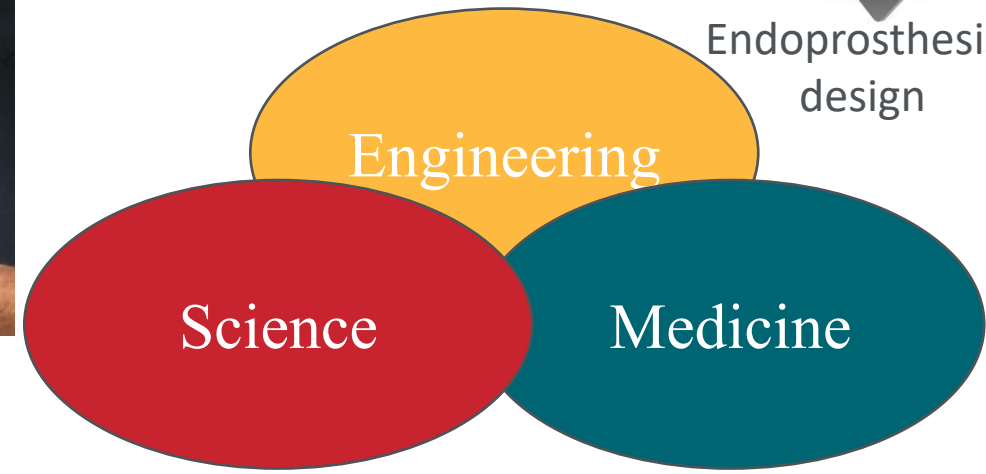


Pressure field inside aorta gen. with CFD.

New Students (All)



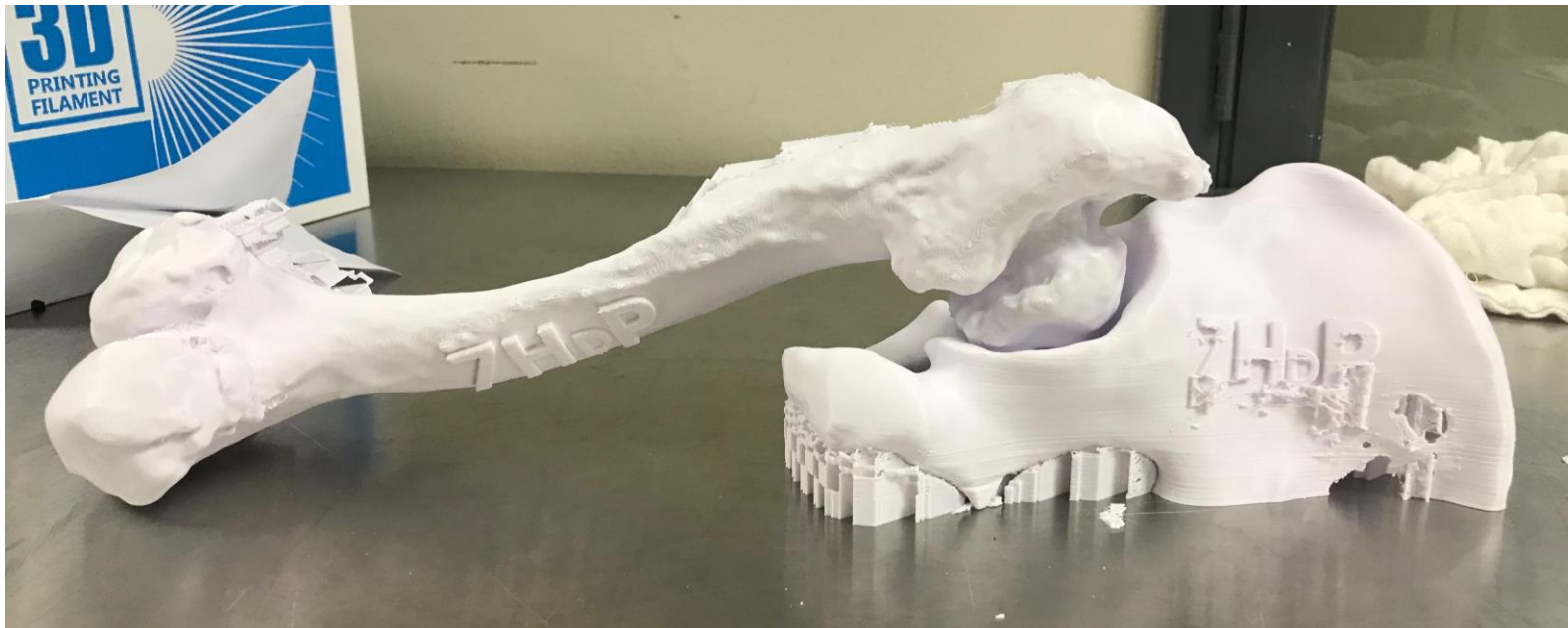
Endoprosthesis design



Benefits of Low Cost Medical 3D Printing

Surgery Rehearsal

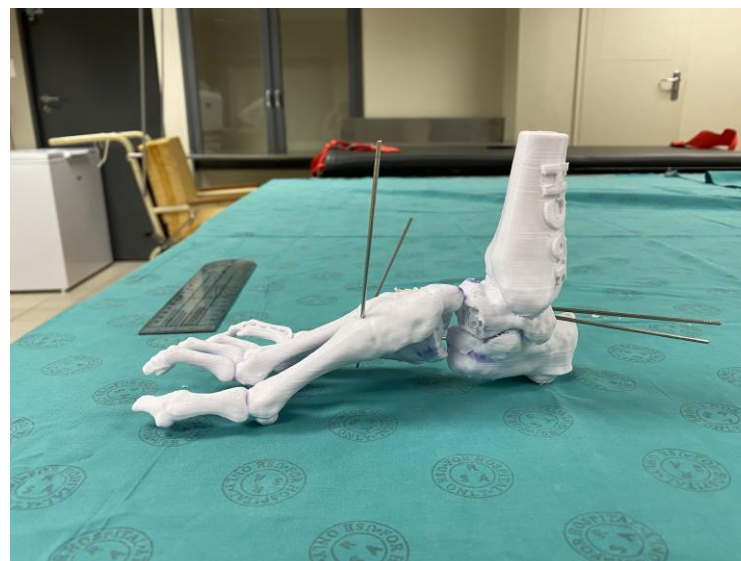
- Simulation encodes a haptic experience before the procedure freeing up surgeon's working memory.



Benefits of Low Cost Medical 3D Printing

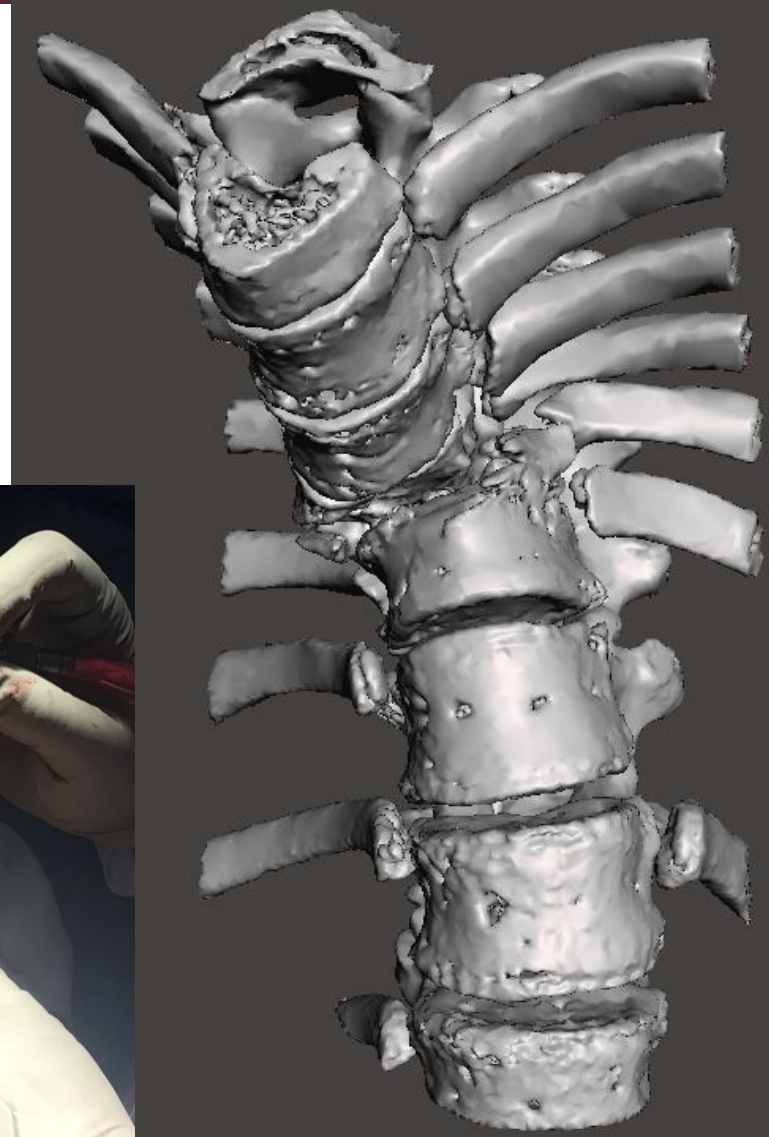
Surgery Rehearsal

- Communication about condition and procedure is improved.
- Surgical plan can be rehearsed multiple times until perfected.



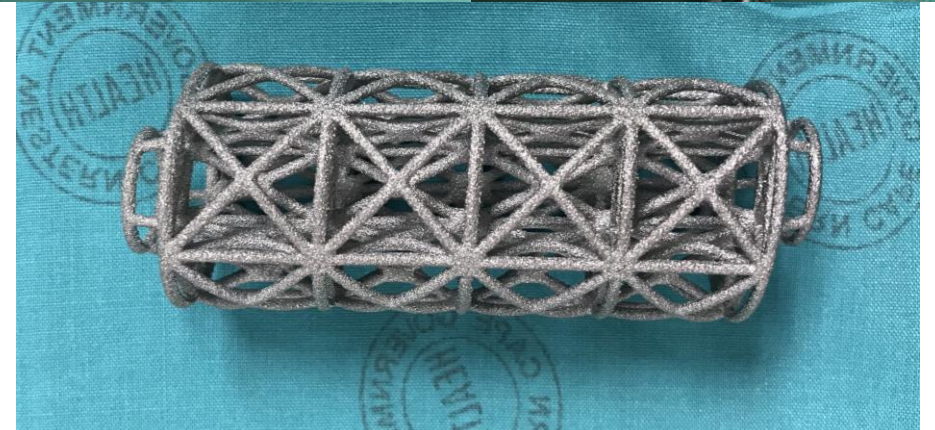
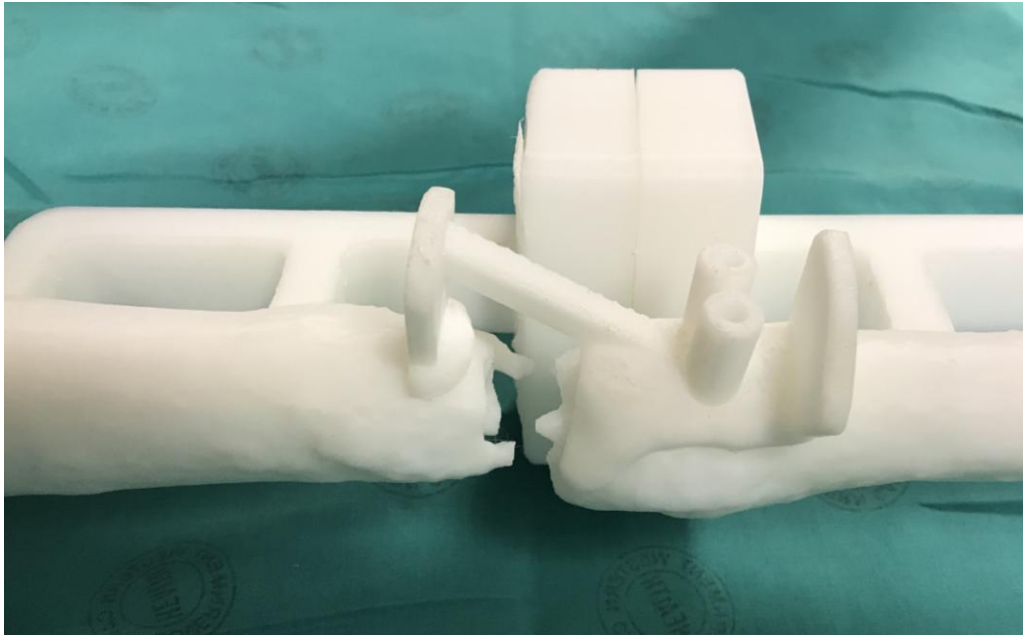
Benefits of Low Cost Medical 3D Printing

Surgical Reference/ Haptic Maps



Benefits of Low Cost Medical 3D Printing

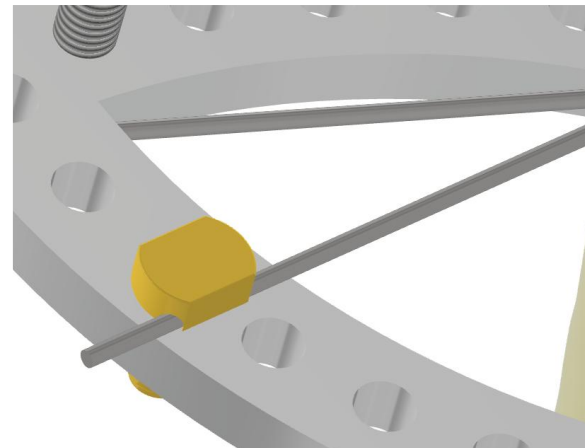
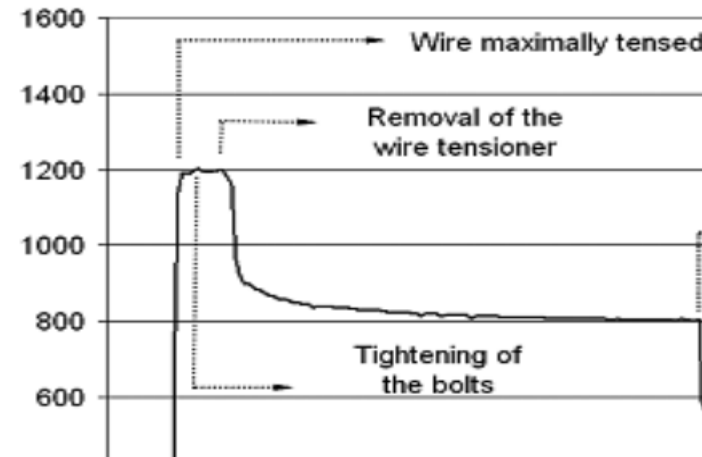
Patient Specific Instrumentation and Implants



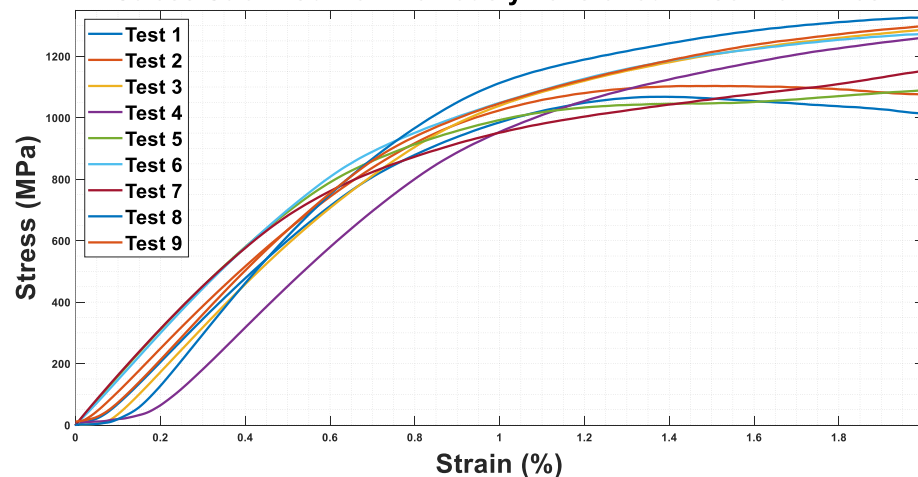
Influence of Loading on K-Wires

Understanding Mechanical properties of the fixation device.

Pre-tension (N)

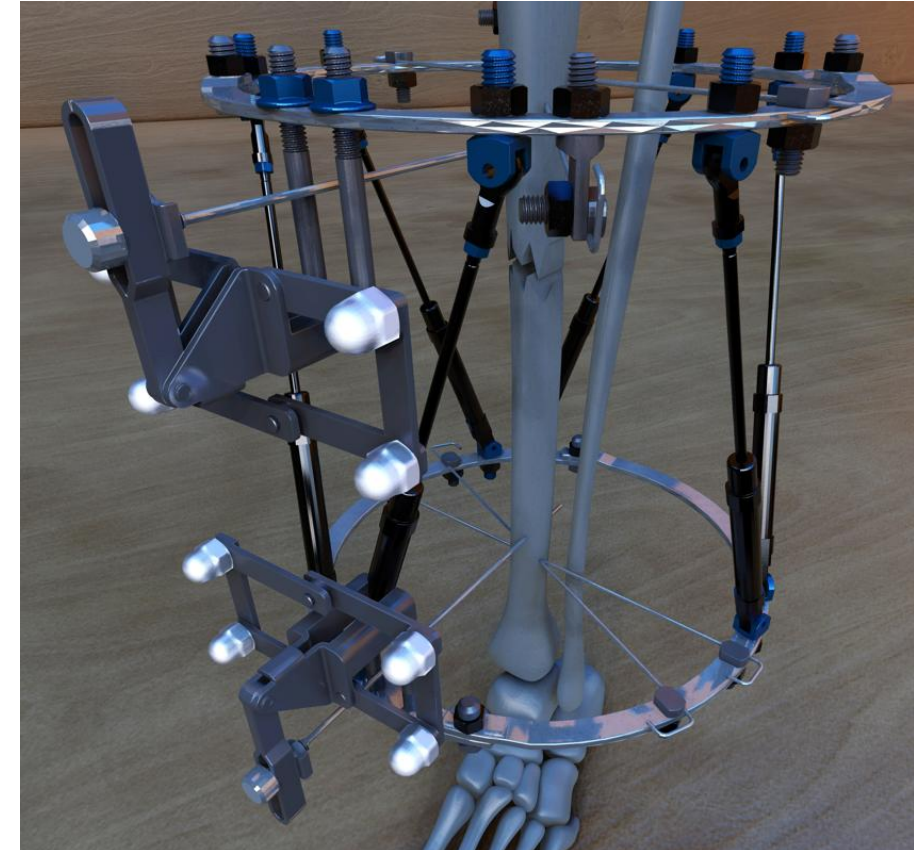
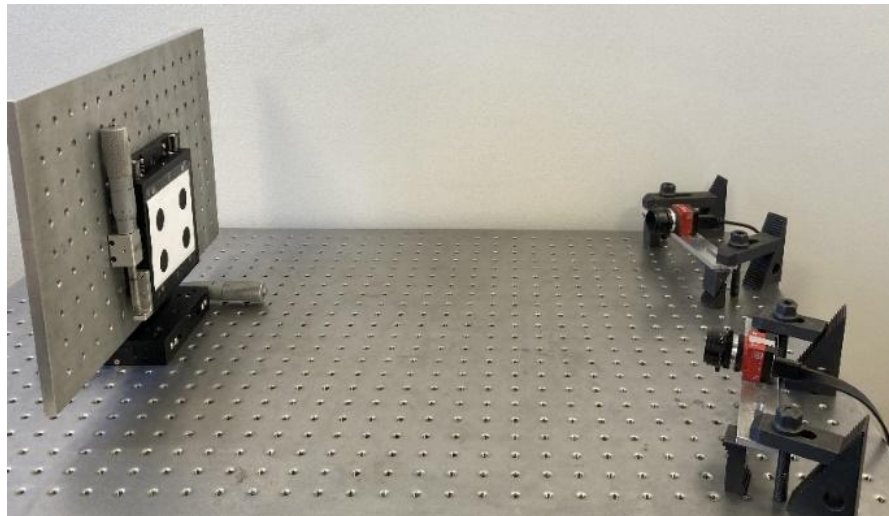


Stress Strain Curve: Previously Tensioned Kirschner Wires



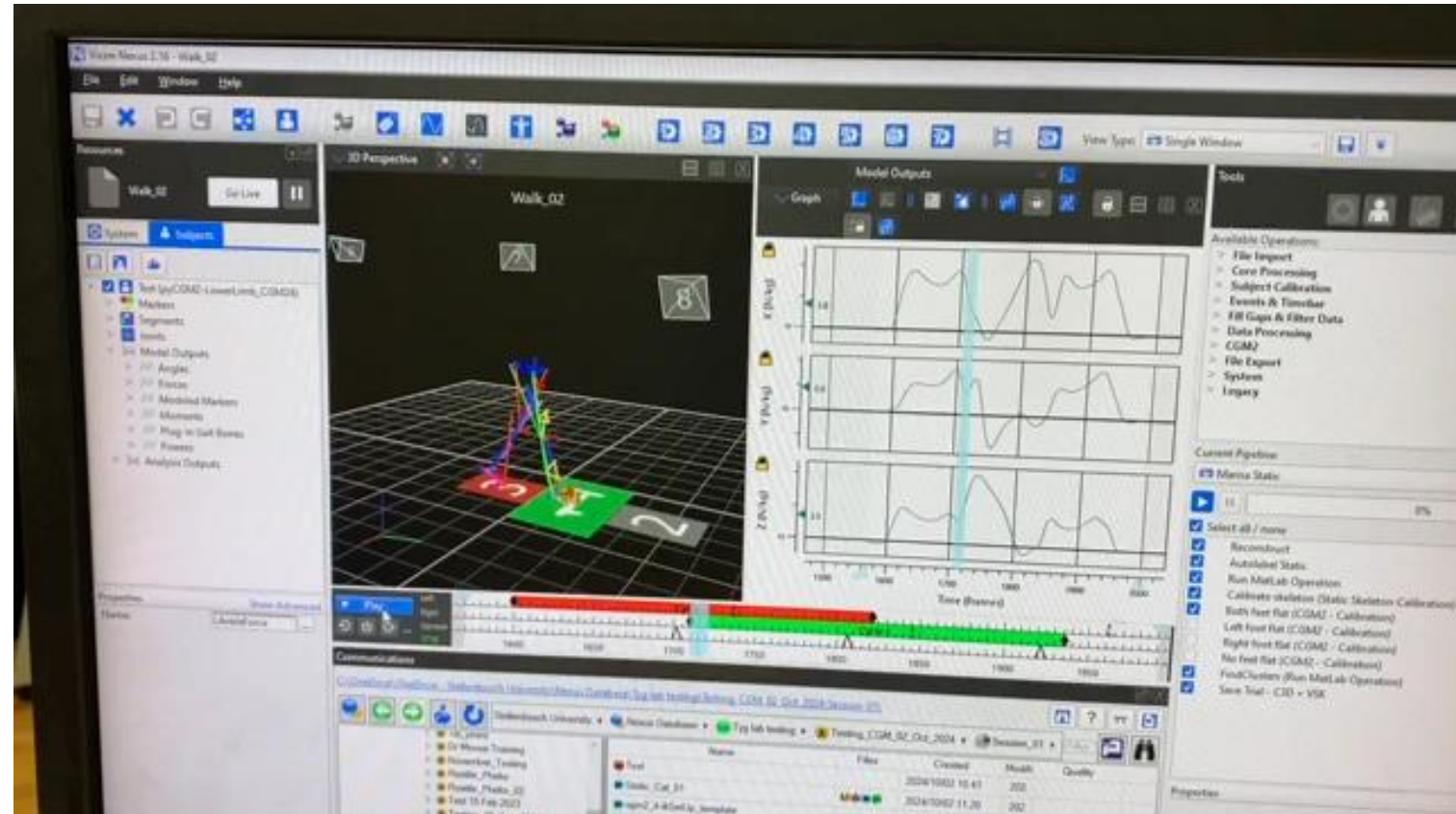
Optical Tracking of Interfragmentary movement

- To understand interaction between external fixator configuration, gait, fragment movement and bone healing
- Accuracy ≈ 0.01 mm



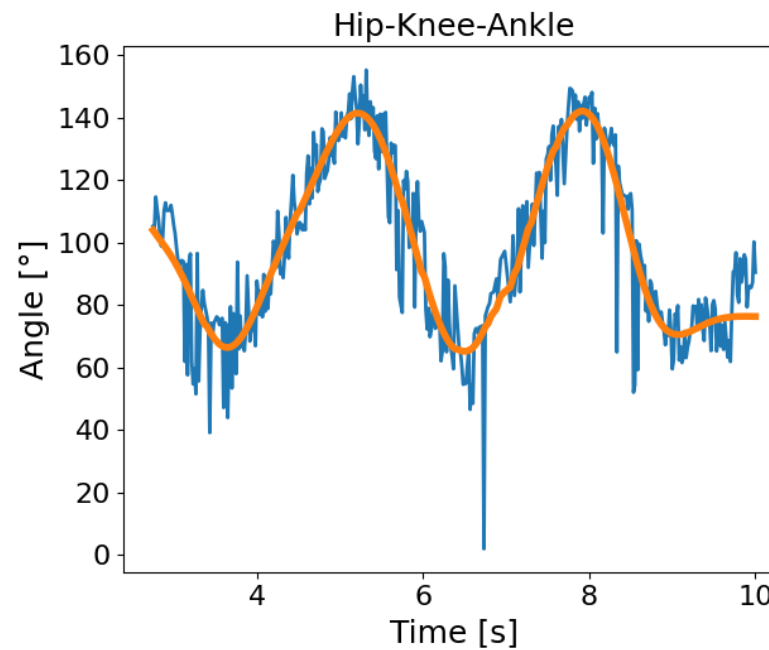
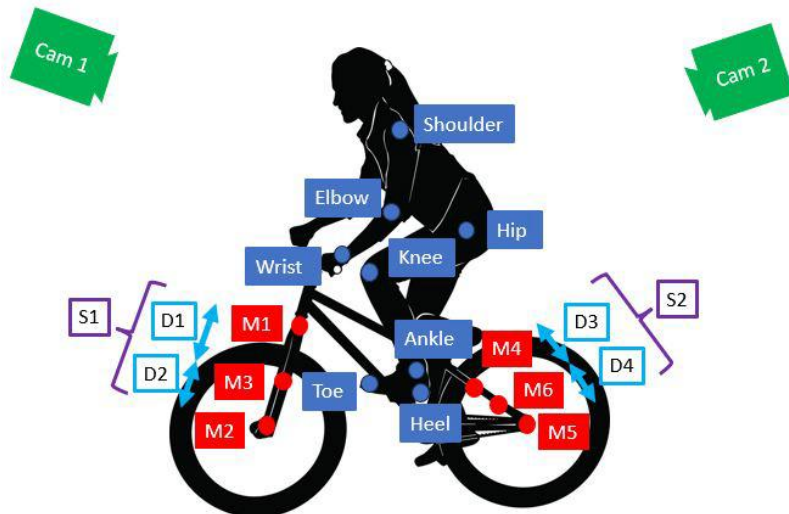
Marker	Session 1	
	Average (μm)	Standard deviation (μm)
Top left	6.710	4.402
Top right	8.736	4.534
Bottom left	3.658	2.416
Bottom right	5.783	3.224

Gait Lab Studies



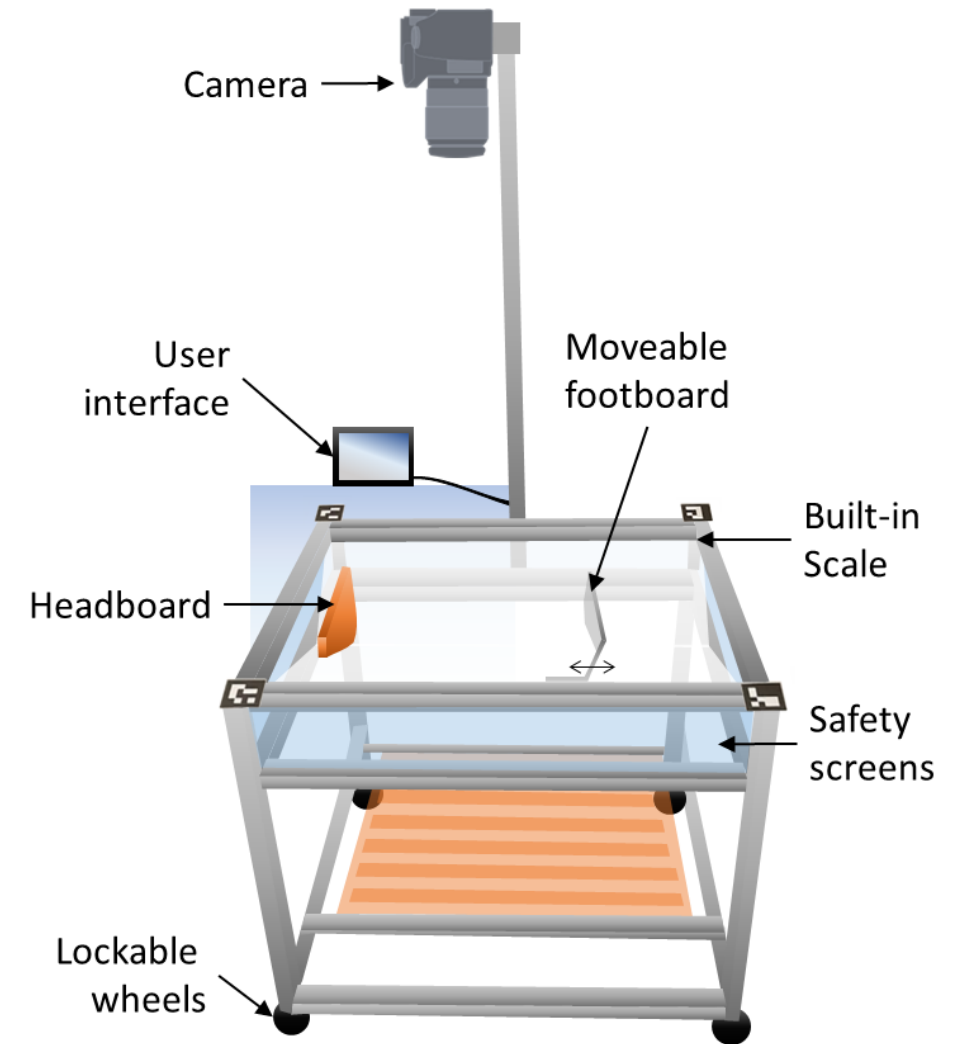
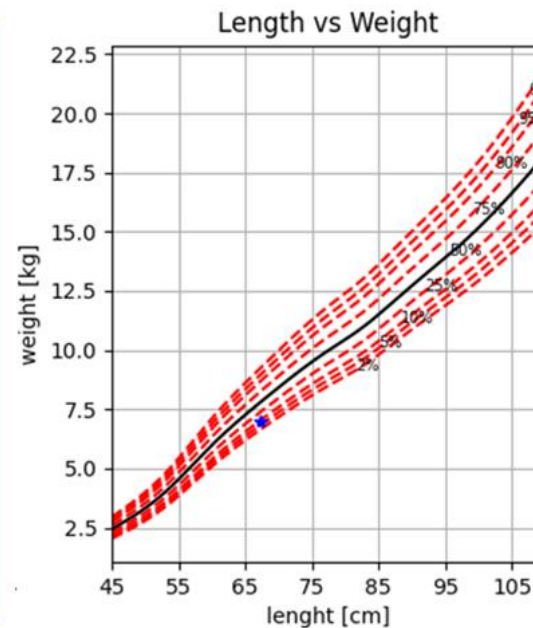
Drone Based Motion Capture

- Multiple, independently moving cameras



Integrated Infant Length Measurement

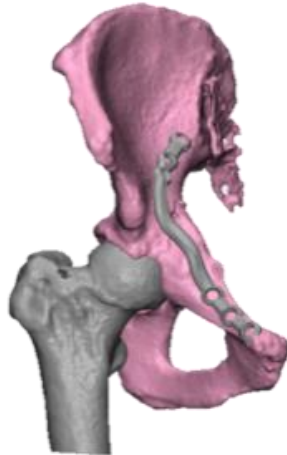
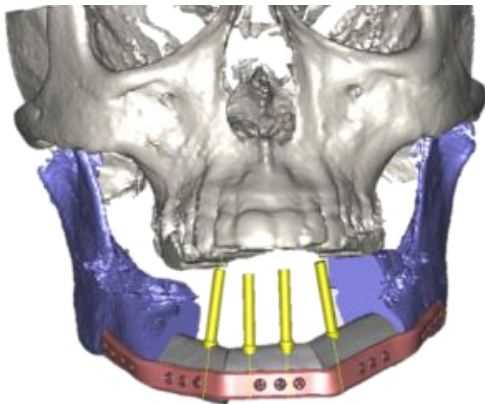
- Early detection of Malnutrition and stunting



Collaboration with Groningen

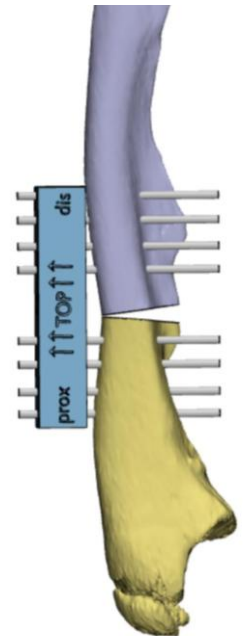
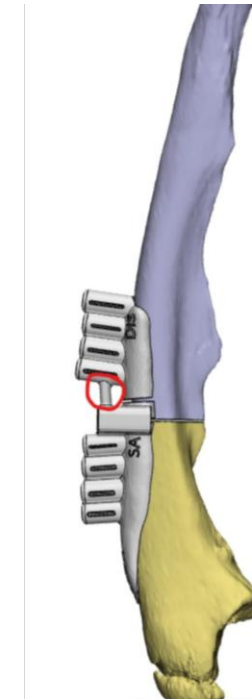
Biomedical Solutions and Imaged Based Research

- Smart Implants and SSM based Morphology



umcg

3D Lab
Groningen





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Thank you
Enkosi
Dankie