

TIMED CENTER CORE FACILITIES MEDICAL SIMULATORS



Hybrid Surgical Simulators

- » Artificial patients: Validated artificial vertebral bodies (in relation to the humane preparation), cement application possible (open-cell structure), realistic X-ray-contrast
- » Imaging simulation: Simulated X-ray-projections for image-led interventions (C-arch-position arbitrary selectable)
- » Computer model: real time 3D-visualization of the anatomy and instruments' position
- » Extended instruments: Sensor integration in existing surgical instruments (location, position, force, pressure etc.), wireless data transmission

This research group at the *FH Upper Austria, Linz Campus* focuses on **developing hybrid simulators**, also called **mixed-reality simulators**. These consist of an artificial patient, a computer model and real surgical instruments that are equipped with sensors. This concept combines the advantages of the different modalities.

The artificial patient phantom provides medical assistants with **realistic haptic feedback**. As **real instruments and implants** are used, surgical interventions can be simulated in a very detailed and realistic way. The use of 3D computer models combined with instruments equipped with sensors allows **imaging simulation**. Furthermore, it is possible to generate patient-specific training scenarios and to assess surgical interventions by means of objective measures.

The **areas of research** include:

1. *Artificial anatomical structures*: Development of artificial bones and tissue with integrated sensor technology (smart artificial tissue)
2. *Surgical instrument equipment*: Extending real instruments with sensors to measure the position, location, force, pressure and temperature
3. *Imaging simulation*: Development of algorithms to simulate established imaging procedures (X-ray, ultrasound)
4. *Validation of simulators*: Biomechanical and medical validation and measuring of learning curves



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