Open surgery SIMULATION
Virtual practice
Real skills™
Medical education and surgical training are going through exciting changes these days. Fast-paced innovation in simulation, virtual reality and computer engineering are giving birth to new possibilities. In years to come, we forecast drastic changes in the way surgery will be taught to medical students and residents. Traditional apprenticeship models are being replaced with proficiency-based models supported by various types of simulation. New tools will revolutionize how we learn to operate on patients.

Simulation-based training offers many advantages to the healthcare system, faculties, students and most importantly the patient. From low-fidelity boxes to high fidelity simulators, simulation to train surgical skills should be integrated in every surgery-program curricula.

In the last years, simulation in healthcare has been gaining global recognition and is now becoming a major key component in medical education. Medical organizations responsible for accreditation of residency programs are strongly encouraging universities to integrate simulation in their graduate education. With significant advances in technology, virtual training simulators are one of the most effective methods to provide the necessary training and instruction, while removing many of the barriers to entry due to cost and risk.

Leading the path in high-fidelity simulation with the world’s first open surgery virtual-reality training simulator, OSSimTech™ is committed to advancing the state of healthcare and medical education. We invite you in the next pages to discover the first-and-only simulator dedicated to open surgeries in orthopedics. Do not hesitate to reach out to our team of professionals to learn more on how OSSimTech™ simulators can help your organization.

André Blain, President and Co-Founder
OSSimTech™ Inc., a Montreal based hi-tech company, specializes in the design, research & development of virtual reality (VR) based open surgery training simulators for medical students and residents. The company thrives on developing the best simulators to respond to the needs of the medical community.

Founded in 2013 by two ambitious and experienced engineers, OSSimTech™ now leads the path in high fidelity simulation. The Sim-Ortho™, is the first commercially available simulator to offer haptic feedback in orthopedics surgery training simulation.

OSSimTech™ puts a special emphasis on collaborating with all the healthcare stakeholders to develop high quality products. Our 3D artists attend live surgeries to develop realistic environments, engineers develop procedures in partnership with orthopedic surgeons and performance metrics are reviewed by the medical community. In addition, OSSimTech™ is supported by several institutions who bring their expertise and experience to our organization.

The technology platform of OSSimTech™ has been developed to provide practical training that mimics the real open surgical environment. To do this, using proprietary software, it provides sensory feedback on visual, audio and touch levels depending on the selected surgical procedure. OSSimTech™ simulators combine in one device the visual display of surgical sites in open surgeries and the use of haptic force feedback actuators that can be mounted on instruments for open surgery (screwdrivers, drills, saws, etc.). This results in a unique and innovative training solution: the Sim-Ortho™.
The Sim-Ortho™ by OSSimTech™ is a virtual reality training simulator to teach and train orthopedic open-surgery. As the world’s first of its kind, the Sim-Ortho™ simulator offers unique possibilities to expand medical education of orthopedic surgery.

The Sim-Ortho™ enables simulation training of complex orthopedic procedures in knee and spine surgery as well as trauma surgery. Situated in a highly realistic 3D environment with detailed imaging, the trainee practices “hands-on” in a risk-free environment. The Sim-Ortho™ training simulator offers haptic feedback (applied force and resistance) and allows handling and manipulation of multiple orthopedic tools. The Sim-Ortho™ training simulator is leading the path in high-fidelity simulation.
Sim-Ortho™ Virtual reality orthopedic open-surgery simulator

Components
1. One quad-core PC
2. One 3D HD flat-screen
3. 5-DoF haptic system
4. 6-DoF tracking system
5. Mock-up surgical tools
6. Height-adjustable mobile cart
7. One HD Touch Screen
8. 3D Glasses
9. Headphones

Developed in collaboration with:
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Dr. Tom Wainwright, M.D.
Orthopedic Surgeon,
Bournemouth University, UK

Affiliated to the University of Montreal School of Medicine
Knee
- Left, right and lighter cases of total knee replacement
- Fibial and tibial osteotomies (Open and closed wedges)
- Tibial Tubercle osteotomy
- Unicompartmental knee replacements (Lateral, medial and patellofemoral)

Spine
- Realistic use of rongeurs, pedical probe, screwdriver, bone nibbler and kerrison
- 10 cases of spinal fusion
- 10 cases of discectomy
- 10 cases of laminectomy

Trauma
- COMING SOON

Tool handling
- User-friendly tutorial to the Sim-Ortho™
- 15+ cases of hands-on training
- Several tools in several environments
Sim-Ortho™ - Simulator map

**Tool handling**
- Cutting
  - Straight & oblique cuts
  - Osteotomy cuts
  - Arthroplasty cuts
- Weber Clamps
  - Open reduction
- K-Wires & Steinmann Pins
  - K-wire techniques
  - Traction techniques
  - External fixation
- Drilling
  - Straight & oblique drilling
  - Internal fixation
- Needle Insertion
  - Compartment syndrome diagnosis
  - Joint injection & aspiration

**Spinal Fusion**
- C1 - T12
- L1 - L4
- L5 - S1

**Laminectomy**
- L1 - T12
- L4 - L5
- C1 - C2

**Discectomy**
- L5 - S1
- L4 - L5
- C3 - C4

**Interbody Fusion**
- TLIF L5 - S1
- L4 - L5

**Scoliosis**
- T4 - L4
- T4 - L1
- T5 - T11
- T4 - L4
- T2 - T12

**Knee**
- Osteotomy
  - Tibial Osteotomy
    - Open Wedge
    - Closed Wedge
  - Femoral Osteotomy
    - Open Wedge
    - Closed Wedge
  - Partial Knee Replacement
  - Lateral
  - Medial
  - Patellofemoral
  - Total Knee Replacement
  - Right Knee
  - Left Knee

**Trauma**
- Fixation-wires
  - Wrist Fx
  - Proximal ulna Fx
- External Fixator Placement
  - Wrist Fx
  - Proximal tibia Fx
  - Tibial shaft Fx
- Cannulated Screws
  - Subcapital hip Fx
  - Transcervical hip Fx
  - Distal femur Fx
- Plate and Screws
  - Wrist Fx
  - Ankle Fx
  - Distal femur Fx
  - Mid-clavicle Fx
- Intramedullary Nailing
  - Intertrochanteric hip Fx
  - Humeral shaft Fx
  - Distal femur Fx
  - Femoral shaft Fx
  - Tibia shaft Fx
- Dynamic Condylar Screws
  - Intertrochanteric hip Fx
  - Distal femur Fx
- Blade Plates
  - Distal femur Fx
Sim-Ortho™ - Module Spine
With better training and education, we develop better doctors and therefore better patient care. With less theater time spent in the OR, residents need the best tools to ensure proper surgery training.

- The Sim-Ortho™ training simulator enables students to practice different orthopedic surgeries that they would normally not necessarily practice often during their residency years.
- Unlike in an OR where a mistake could injure the patient, training on the simulator allows residents to make mistakes and learn without consequences.

Practice makes perfect

Practice and repetition of complex surgeries on OSSimTech™'s VR simulator accelerate the learning curve of its users.

- The Sim-Ortho™ surgical simulator helps residents reach a predetermined level of high proficiency and allow them to go into the OR and fine-tune their skills starting from a higher level.
- We provide training (that currently does not exist in any form of virtual reality at all) in procedures that carry significant morbidity, risks of patient complications and poor functional outcomes.
The use of the Sim-Ortho™ training simulator will contribute to surgical training with a reduction in the use of OR and material costs. This means less space required, reusability, no consumables and no mess! Wet labs and use of cadavers offer advantages but also come with significant disadvantages.

- Costs for academic institutions are very high (not including maintenance fees) with low repeatability.
- Health problems from exposure to embalming chemicals and religion issues are also common disadvantages associated to cadaver use.
- Finally and most importantly, cadavers will most likely not present the pathologies that must be learned (Osteoarthritis, Scoliosis, Hernias, etc.)

The Sim-Ortho™ simulator is the perfect complement to cadaver labs. Residents develop a high level proficiency on the simulator before perfecting their art on cadavers and in the OR.

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**Unique educational experience**

With the Sim-Ortho™ simulator, we provide a unique educational experience where you feel in your hand what you see on the screen! OSSimTech™ simulators:

- Allow handling and manipulation of multiple orthopedic tools in a highly realistic 3D environment mimicking the sound, force, and imaging of real-life actions in surgery.
- Use its patented technology of real-time haptic feed-back (applied force and resistance) to provide a real “hands-on” feeling of handheld tools such as saws, screwdrivers, rongeurs or drills.
- Develop the cognitive process of surgery where the trainee is involved in decision-making to optimize the outcomes of the procedures.

**Cost-saving**

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The Sim-Ortho™ provides objective feedback on each task performed by the trainee. After each completed procedure, the user receives a feedback based on metrics developed with experts.

With medical education transitioning from an apprenticeship model to a competency-based model, there is a need for new education tools that can provide objective performance feedback to better assist the training process of residents, especially in surgery training.
Sim-Ortho™ - Testimonials

“I believe OSSimTech’s Sim-Ortho™ simulator will have a direct impact on student’s performances. It will contribute to accelerate their learning process and significantly improve their skills and confidence while minimizing patient risks in the O.R.”

- Dr. Vincent Massé M.D., Orthopedic Surgeon,
  Maisonneuve-Rosemont Hospital

“OSSimTech™ are a hugely impressive technology start up. Not only have they brought to market the first open knee replacement simulator, but they are committed to working in partnership with clinicians in order to improve and make Sim-Ortho™ increasingly realistic.”

- Dr. Tom Wainwright M.D., Orthopedic Surgeon,
  Orthopaedic Research Institute / Bournemouth University

“The Sim-Ortho™ is a platform that simulates 3D virtual reality interventions. Through its haptic devices, this platform has the capacity to relay a realistic tactile feedback that is very similar to the feedback experienced during real surgery. This system is designed for training to help surgeons acquire and master critical skills to ensure surgical efficiency and safety.”

- Lahbib Soualmi M.D., PhD,
  King Fahad Medical City Riyadh, Saudi Arabia