SINA

Robotic & Medical Innovators

Innovation and Quality

www.SinaMed.ir

Parsa Medica Group is a pioneer in the field of high technology healthcare devices. We do believe that the advancement of technology affects the health directly and saves lives on a daily basis. The experts in Parsa Medica are always willing to bring two fundamental qualities to their work: devotion and thoroughness in order to bring high quality innovation in their products. Our vision is to become a world class brand in medical equipment and devices.

We aim to provide the best quality medical equipments with the most competitive price. The knowledge density of our research and development team is significantly high with our staff almost having 20 PhDs and over 31 Msc degrees in the field of medical physics and biomedical engineering. We are always interested in new collaborations.

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Innovation and Quality

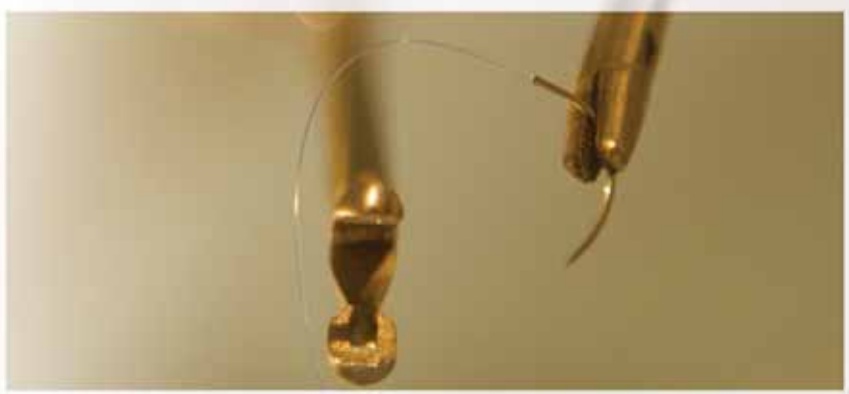
SURGERY

Sina

A Robotic Telesurgery System with Force Feedback

Description:

Sina is a complete robotic telesurgery system with force feedback which can be used for performing remote surgery operations through internet or other communication channels. This system has two main subsystems including a master robotic console at surgeon's side and a slave robotic system at patient's side with two robots which are installed on the sides of a specific surgery bed. A robotic cameraman called RoboLens is also integrated into the system to take the intra-abdominal images of the patient and send them to the surgeon's master console. The master robots receive the surgeon's hands movements and transmit them to the patient's side slave robots that mimic the movements in a real-time manner. Simultaneously, the slave robots measure the robot and patient interaction forces/torques, including the pinch forces under instruments jaws, and transmit them to the surgeon's side master robotic system.



Main Features

- **Master Robotic Console (at surgeon's side)**
- Ergonomic console base with 3 adjustable DOFs to bring a comfortable workstation for surgeon
- Two 5 DOFs back drivable master robots to be manipulated by surgeon's hands
- Software clutch for adjusting the master robot orientation to provide maximum comfort for surgeon
- Foot pedals for controlling the laparoscopic camera and electrocauter
- Extra roller to provide continuous rolling as in commercial hand-held laparoscopic tools

- **Slave Robotic System (at patient's side)**
- Adjustable bed with 3 active DOFs
- Two bed-side passive robots with 3 Cartesian motions for adjusting the active robots' RCMs and two Pan-tilt DOFs for adjusting the initial orientation of the active robots based on the surgery type and positions of entry points
- Two bed-side 5 DOFs surgery robots

Teleoperation

Advantages:

- Force feedback capability
- More ergonomic posture for surgeon
- Highly maintenance-free operation
- Bed movements / pan-tilt rotations during operation
- Surgeon's hand tremor reduction and movements scaling
- Acceptance of a wide range of conventional surgery instruments

Technical Specification

Master Robotic Console	
Total dimensions (L × W × H)	180 × 95 × 150 cm³
Total weight	210 kg
No. of total active DOFs	10 motorized joints (5 for each master robot)
No. of total passive DOFs	6 joints plus two 6 DOF articulated arms for holding monitors
Local communication frequency	1 kHz
Main monitor resolution	Full HD (1080 × 1920)

Slave Robotic System	
Total dimensions (L × W × H)	200 × 220 × Max.215 cm³
Total weight	260 kg
No. of total active DOFs	16 motorized joints (5 for each surgery robot, 3 for cameraman robot & 3 for surgery bed)
No. of total passive DOFs	13 joints (6 for each surgery robot & 1 for cameraman robot)
Local communication frequency	1 kHz
Endoscope resolution	Full HD (1080 × 1920)
Movement resolution	1 micro meter in each direction at no load operation
Pinch Force sensing resolution	0.1 N
Interaction force sensing resolution	0.5 N

RoboLens

A Laparoscopic Surgery Assistant Robot

RoboLens may hold and maneuver the laparoscopic lens as a surgeon's third hand. Using the RoboLens, surgeons perform solo-surgery procedures very faster than conventional methods with a human assistant.

Advantages

- Smooth 6 direction movement
- Stable view with no unwanted movement or vibration
- Reducing the surgery time to less than half
- Reduction of the supernumerary staff
- Preparation for surgery in less than 100 second
- Setting robot's head above surgeon's head
- No contact with other surgery devices and surgeon's hands
- Portable between different operation rooms
- Sterilizable and detachable arm and end effector
- Autoclavable end effector clamp

Various control methods

Clinical Skills Training

LP Sim

A Robotic Lumbar Puncture Simulator/Trainer with Force Feedback

Lumbar Puncture Simulator (LP Sim) is a robotic system that may be used for education and evaluation of LP skills using virtual reality environment with force feedback. It is designed to maximize efficiency in LP skills acquisition and evaluation for medical residents.

Description:

Students can feel lifelike haptic feedback of passing each layer from this device while viewing a full 2D representative of spinal cord to ensure highest level of education quality.

The magnitudes of forces are adjusted for sense different layers including Skin, Subcutaneous fat, Supraspinous ligament, Interspinous ligament, Ligamentum flavum, Epidural space and Dura, same as inserting needle in human spine.

We have accurately measured forces during standard Lumbar Puncture procedures and realistically recreated them on virtual environment. Thus, the trainees will experience a high fidelity haptic vision of the Virtual Environment.

Advantages:

- No limits on number of injection
- No consumable parts
- Sectional view of lumbar area and different layers during insertion
- Adjustable resistance to simulate aging effect

Sina Sim

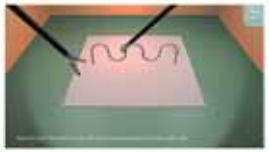
Laparoscopic Surgery Trainer/Simulator

SinaSim is a combination of computer hardware, mechanical user interface and software modules which simulate the procedures and environment of Laparoscopic surgery, based on Virtual-Reality environment.

This system not only greatly reduces the maintenance cost of training surgeons, but also will ensure maximum efficiency in learning laparoscopic surgery skills.

Essential Training Tasks:

SinaSim basic software modules provide a curriculum based on MISTELS/FLS standards to maximize the efficiency in learning essential skills

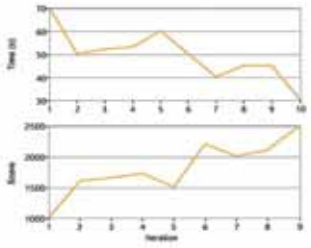


Advance Surgery Simulation:

SinaSim allow the users to practice real and advance surgeries in highly realistic, safe and motivating learning environment

SoftwareTechnical Specification

	SinaSim Basic	SinaSim Advance		SinaSim Basic	SinaSim Advance
Simple Path Navigation	✓	✓	Essential Skills Evaluation	✓	✓
Advance Path Coordination	✓	✓	Performance Report Generator	✓	✓
Object Manipulation	✓	✓	Customizable PDF Report	✓	✓
Standard FLS Peg and Hole	✓	✓	Multi-User Interface	✓	✓
Camera Navigation	✓	✓	Upgradeable License	✓	✓
Cholecystectomy Surgery Simulation	✗	✓	Upgradeable Software	✓	✓
Surgery Skills Evaluation	✗	✓	Online Software Support Service	✓	✓



Performance Tracking:

SinaSim allows the trainee to track development of his or her skills. Moreover, these performance data can be used to measure and assess the trainee's current skill level.

LP Model

A Lumbar Puncture (Epidural/Spinal) Training Model

Real Feeling

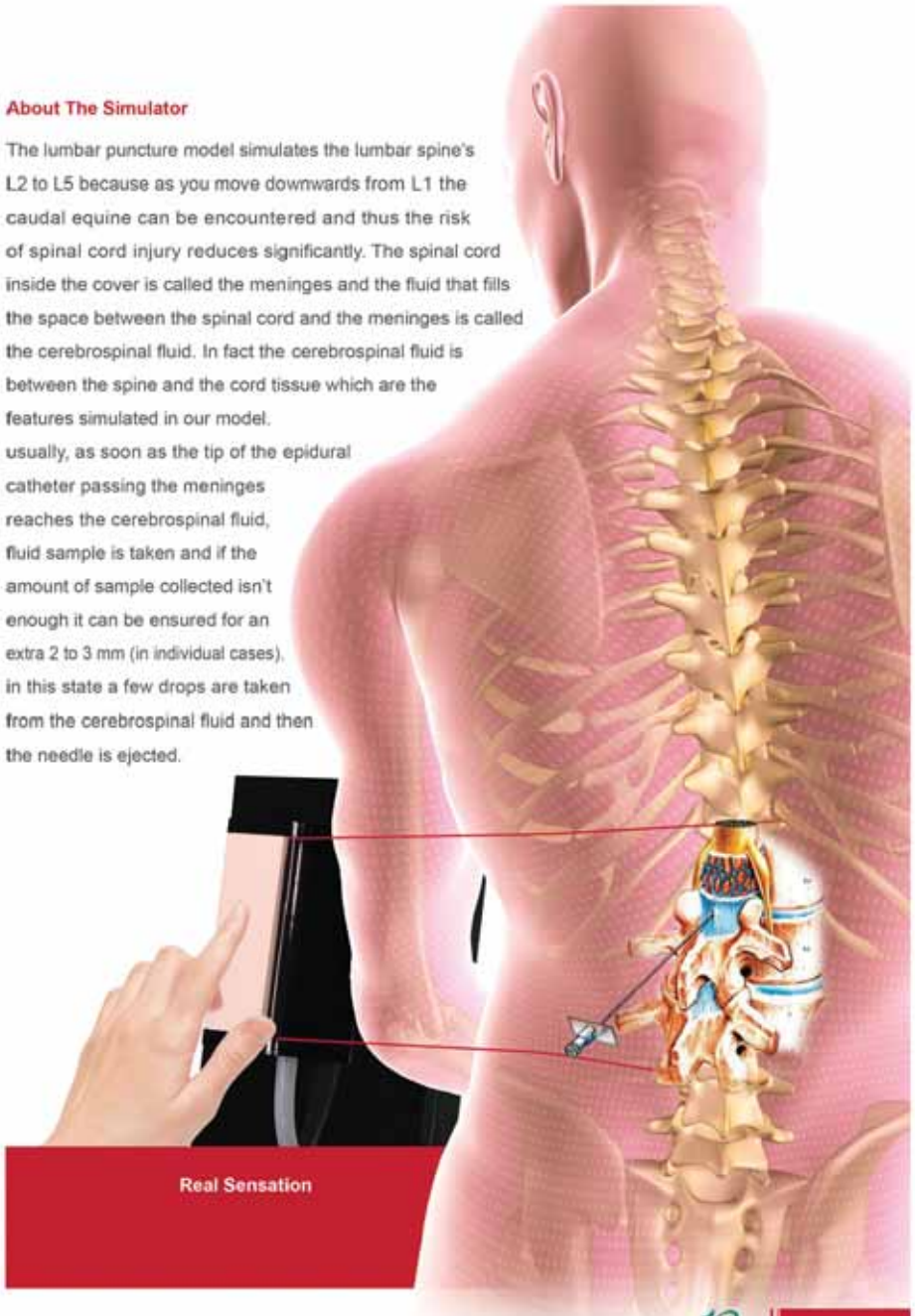
Every single method of diagnostic and therapeutic has the risks of its own; hence the Lumbar Puncture is not safe either. The main risk that threatens the patients in the Invasive operation is the probability of any contact happening in between the epidural catheter and the cord tissue, which may cause serious harm and pain.

The lumbar puncture model has been designed to eradicate the risk of harm to the patients. It has been designed by medical education specialists to allow students and medical professionals to practice as frequently as enough and to achieve high levels of procedural competence and to enhance formal LP procedural skills abilities via training and assessment.

About The Simulator

The lumbar puncture model simulates the lumbar spine's L2 to L5 because as you move downwards from L1 the caudal equine can be encountered and thus the risk of spinal cord injury reduces significantly. The spinal cord inside the cover is called the meninges and the fluid that fills the space between the spinal cord and the meninges is called the cerebrospinal fluid. In fact the cerebrospinal fluid is between the spine and the cord tissue which are the features simulated in our model.

usually, as soon as the tip of the epidural catheter passing the meninges reaches the cerebrospinal fluid, fluid sample is taken and if the amount of sample collected isn't enough it can be ensured for an extra 2 to 3 mm (in individual cases). in this state a few drops are taken from the cerebrospinal fluid and then the needle is ejected.



Real Sensation

IV Model

An Intravenous Injection and Blood Sampling Training Model

This Intravenous Injection and Blood Sampling Training Model has been designed to give less experienced trainers the ability of frequent practice before confrontation with the patient's arm so that it can enhance their experiences in different techniques ranging from confirmation of the injection site to inserting hypodermic needles and the injection of medicine.

The needle insertion provides a feeling similar to that offered by a real human arm, thus the pressurized blood vessel can be palpated.

The blood vessel tube is durable enough to be used in numerous injection practices.

Considerations:

There are a few considerations corresponding the simulator to be taken in mind:

- Its care and treatment should be the same as with a patient; abuse or rough handling will damage the simulator- just as it would cause pain to a patient
- This unit is the simulation of the entire human arm from the shoulder to fingertips.
- Externally the skin texture is realistic to touch
- Although this arm will provide you long trouble-free usage, the skin and veins can be readily replaced when needed
- The life of the replaceable skin and veins will be prolonged by utilizing smaller needle sizes (such as 20- to 25-gauge).

Real Sensation