Laser Line Directional System for 3D-Anatomy Ultrasound Phantom Trainer

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Technology description

Background:
The skill of performing ultrasound is becoming a standard in medical education and clinical practice across a wide range of disciplines such as anatomy and pathology and clinical practice from primary care to orthopedics and neurosurgery. Ultrasound is being used as a clinical tool by physicians, nurses, physician assistants, emergency medicine technicians, midwives, medics, and other healthcare providers. Portable ultrasound is also being used by teachers in primary, secondary, graduate, and postgraduate education to teach life sciences.
With so many new learners to ultrasound, it is essential that methods are developed to assist in their training. One method that has been developed is the use of phantom models of human tissue for learners to scan with ultrasound in order to improve their skills in obtaining a quality ultrasound image while gaining an appreciation of anatomy and pathology. Phantoms are also used to help learners develop skill in using ultrasound to guide a needle or catheter to a particular internal structure such as a blood vessel or joint space. The phantom model is embedded in a gel that allows ultrasound waves to penetrate the gel and reach the target tissue structure to produce an ultrasound image similar to that obtained with live models.
Invention Description:
Laser light that can easily be seen while penetrating clear gel will be added to an ultrasound probe in order to show the direction of the invisible ultrasound waves as they come out of the ultrasound probe. The return or echo of the ultrasound waves to the probe after they hit an object in their path is what produces the image on the ultrasound screen. In learning ultrasound, phantom or gel models with human anatomy-like structures such as latex tubing for a blood vessel are embedded in the gel and are used to help learners develop the skill of manipulation of the ultrasound probe to obtain quality ultrasound images. Adding a laser light in the same direction as the ultrasound waves will give the learner immediate visual feedback as to whether the anatomy-like structure is being adequately struck by the ultrasound waves to produce a quality ultrasound image. This will enhance the learner’ s ability to acquire effective ultrasound scanning skills and further learn anatomy.

Application area

A major limitation to the incorporation of ultrasound as a powerful teaching and clinical tool that can improve quality of medical care, improve patient safety, and decrease healthcare cost while increasing access to important healthcare technology is the lack of qualified users and instructors. Simple and effective methods to teach new learners of ultrasound scanning are badly needed. This ultrasound probe with laser light will provide immediate visual feedback and help the learner develop the manual dexterity and fine motor control of the ultrasound probe important to ultrasound scanning and capturing the best ultrasound images. This invention will enhance learning of ultrasound scanning, and because of its simple and straightforward design, it can minimize the need for extensive direct supervision in training.

Advantages

The laser component built into new probes will be an advantage to ultrasound systems manufacturers, and the attachable laser component will be an advantage to simulation/phantom model companies. The laser component can be turned off or removed from the probe if it is not being used for learning purposes. It will be cheap relative to the value it will add to ultrasound training, and provide a distinct commercial advantage. Ultrasound-guided catheter placement into blood vessels and ultrasound-guided placement of medication into joints are the most common daily applications of ultrasound, and this invention is ideal for helping learners develop skill and competency in both of these applications.

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