IMG-97-003 - ULTRASOUND -System and Method for 4D Ultrasound Imaging

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Technology description

Description

This invention concerns a system and method of obtaining four-dimensional (4-D) ultrasound images of moving tissue such as the human heart or lungs, where time is the fourth dimension. 3-D ultrasound imaging has proven useful for generating high fidelity snap shot images of non-dynamic organs such as the breast, prostate, or liver. However, the volume of dynamic or moving organs such as the heart or lungs changes over time. As a result, there was a need in the art to simultaneously acquire and view 3-D images of moving organs over time. The 4-D ultrasound imaging or dynamic 3-D imaging technique of this invention is best described using the beating heart as an example. A plurality of two-dimensional (2-D) ultrasound images is taken of a beating heart and the data acquisition time is determined. The 2-D data are split into successive phases of the heart beat. 3-D images are then reconstructed from the successive 2-D phases. Time-dependent 3-D images are stored in a computer memory so that they can be retrieved and displayed successively to yield a real-time image of the beating heart. The patented systems and methods of dynamic display may also find application for 3-D image data obtained through other techniques, such as magnetic resonance or computed X-ray tomography.

Opportunity

Ultrasound is one of the most widely accepted medical imaging modalities since it is safe, non-invasive, versatile and cost-effective. As a result, ultrasound instruments are reported to account for approximately 68 per cent of all medical imaging units sold annually on a global-basis. Global sales of ultrasound imaging equipment were projected to be $3 billion in 2000. The United States has been estimated to account for 33% of the worldwide sales of ultrasound devices. The number of ultrasound imaging procedures that are performed within the United States has increased from 79 million in 2000 to 83 million in 2002. Ultrasound systems that are equipped with 4-D imaging capability sell for approximately $200,000. The fees for imaging procedures performed using 4-D ultrasound systems start at about $400. 4-D ultrasound imaging procedures are not limited to cardiac, respiratory, fetal, breast and prostate biopsy. An ability to image the movement of an organ or object within the body is expected to lead to the development of further ultrasound-based diagnosis or treatment procedures.

Institution

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联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com