Spatially Distributed Fourier Domain Optical Coherence Tomography

Published date: Oct. 25, 2012

Technology description

Technology

Optical coherence tomography is a non-invasive imaging technology used for performing high-resolution cross-sectional imaging. Optical coherence tomography utilizes infrared light (in the range of approximately 800 to 1300 nm). The image produced from optical coherence tomography is constructed by measuring the echo time delay and wavelength of light backscattered or back-reflected from the material being imaged. The resolution of optical coherence tomography is significantly higher than ultrasound technology.

Researchers at Lehigh University have developed an enhancement to optical coherence tomography that can achieve significant improvement of imaging speed without losing image sensitivity. The approach utilizes space-division multiplexing technology that translates the long coherence length of a commercially available tunable laser into high optical coherence tomography imaging speed. The achievement of an effective 800,000 A-scans/s imaging speed using a commercially available 100,000 Hz tunable VCSEL light source and a single detection channel has been demonstrated in research studies.

The core element of the approach is splitting the imaging beam to illuminate multiple physical locations of the material being imaged simultaneously. Each beam that is split is optically delayed so that when images are formed, signal from different physical locations is detected in different frequency bands of the detection system. This enables parallel detection of signals from multiple imaging points leading to significantly improved imaging speed.

The optical coherence tomography market was estimated at approximately $700 million in 2015 and is expected to increase to $1.8 billion by 2024 with annual growth rates over 11%. Optical coherence tomography is primarily used in ophthalmology; however, the technology is gaining market penetration in other medical applications including dermatology, cardiology, oncology and others. Technological innovation and improvements in the design of devices along with utility of advanced software is expected to drive growth in the market.

Advantages

⍰ Could be integrated into existing or next-generation optical imaging systems with little increase in overall costs
⍰ High-speed and high-sensitivity of the technology enables less motion artifacts and deeper imaging depths
⍰ Imaging speed is improved by up to twenty times or more and can lead to an improvement in clinical throughput and a reduction in patient stress in medicalapplications
⍰ Utilizes a single detection channel to obtain information

Institution

Lehigh University

Inventors

Chao Zhou

联系我们

叶先生

电 话：021-65679356
手 机：13414935137
邮 箱：yeyingsheng@zf-ym.com