Columbia Technology Ventures

High speed and high sensitivity imaging through spectral-domain optical coherence tomography

Technology #cu14281

Optical coherence tomography (OCT) enables visualization of both translucent and opaque materials in real time, and is particularly useful in the evaluation of biological tissue. Swept-source OCT is a high-speed format that permits 200 kHz acquisition, but the reduced exposure time limits the signal-to-noise ratio (SNR) and sensitivity. The use of near-infrared light, which scatters less than visible light, has permitted an increase in the SNR, but near-infrared photodetectors are not as powerful as those for visible light. This technology is a swept-source OCT design that combines the advantages of both wavelengths, making it possible to image with the penetrance and cleaner signals of near-infrared light, while using high-performance visible-light photodetectors. The result is an OCT system that is likely to provide higher-quality imagery and improved diagnostic capabilities.

Swept-source OCT with near-infrared light source and visible-light photodetection for high-performance imaging

This technology makes use of nonlinear optics processing to provide a more sensitive high-speed OCT system, enabling rapid, real-time volumetric imaging with high SNR. Though any application of OCT can benefit from this technology, it will be particularly useful for in vivo and dynamics imaging, where motion artifacts and low SNR are especially problematic. The theoretical basis for the design has been validated, and current efforts are geared toward building a physical prototype.

Lead Inventor:

Christine P. Hendon, Ph.D.

Applications:

- OCT imaging of translucent and opaque materials
- High-speed, high-sensitivity imaging of in vivo and dynamic biological processes
- Clinical diagnostics, including visual identification of vascular plaques, dermatological moles, gastrointestinal carcinomas, etc.
- Surgical histopathology, for pre-, intra-, and post-operative evaluation of tissue

**Advantages:**

- Combines high acquisition rates with high signal-to-noise ratios
- Can be used in any OCT imaging application
- Based on existing, proven OCT technologies

**Patent Information:**

Patent Pending

Tech Ventures Reference: IR CU14281

**Inventors**

Christine P. Hendon