Non-Invasive Blood Flow Monitoring

Tech ID: 29597 / UC Case 2018-635-0

ABSTRACT

Researchers at the University of California, Davis have developed a non-invasive, interference-based, optical device for blood flow monitoring. This technology is distinct from Diffuse Correlation Spectroscopy (DCS) and can be used alone, or to enhance conventional near-infrared spectroscopy (NIRS) oximetry, by providing information about flow supply.

FULL DESCRIPTION

Steady cerebral blood flow (CBF) is required for normal brain function. Continuous monitoring of CBF in humans in natural environments, however, is currently impractical. Conventional Diffuse Correlation Spectroscopy (DCS) is used to measure CBF but relies on light particle (photon) counting technology to detect blood flow. This costs several thousand dollars per detector, and is susceptible to ambient light noise.

Researchers at the University of California, Davis, have developed a low-cost portable near-infrared light-based (optical) sensor to monitor CBF continuously and noninvasively. This "Interferometric Diffusing Wave" (iDWS) technology uses complementary metal–oxide–semiconductor (CMOS) cameras, widely found in cell phone cameras and other mass-produced devices, to replace expensive optical CBF detectors. By using interferometry, each CMOS camera pixel is used as a detector for fluctuations of light. These fluctuations can be used to detect blood flow in the brain. The numerous pixels also negate problems associated with photon counting as each CMOS camera pixel can behave as an independent detector, making the CBF reading resistant to ambient light.

APPLICATIONS

- Non-invasive measurement of cerebral blood flow in infants or adults
- Non-invasive measurement of blood flow in tissues other than brain
- Improve CBF monitoring in cardiac surgery, neurotrauma, and ischemic stroke
- Biometric screening
- Testing soldiers or athletes after a head injury
- Wearable monitoring device
- Real-time Brownian diffusion in organic and inorganic colloids

FEATURES/BENEFITS

- Scalable, non-invasive
- Ability to function in ambient light
- May reduce cost significantly compared to DCS through the use of non-scientific grade CMOS detectors
- Short measurement intervals enable assessment of pulsatile flow parameters

PATENT STATUS

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<td>Patent Cooperation Treaty</td>
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Additional Patent Pending

OTHER INFORMATION

KEYWORDS

diffuse, correlation, spectroscopy, diffusing wave spectroscopy, near-infrared spectroscopy, non-invasive imaging, blood flow, tissue optics, dynamic light scattering, diffuse correlation spectroscopy, DCS, NIRS, oximetry, interferometric diffuse wave spectroscopy, iDWS, CMOS,

RELATED CASES

2018-635-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- In Vivo Retinal Imaging via Improved Visible Light Optical Coherence Tomography (OCT)
- Dynamic Contrast Optical Coherence Tomography (DyC-OCT): An Improved Method to Quantify Blood Flow Dynamics in Deep Tissue and Microvasculature