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Pupillometer with Direct and Consensual Pupillary Reflex Measurement and Disease Classification

A highly sensitive pupillometer uses telecentric lenses, invisible infrared light, and a deep learning convolutional neural network to provide accurate and fast biodynamic image acquisition for reliable neurological diagnostics and lesion pinpointing.

Researchers at Purdue University have developed a new pupillometer for detecting sensory and motor function in the brain. The highly sensitive pupillometer can evaluate activity in the optic nerve and oculomotor nerve as well as conduct stem assessment. In addition, the device uses a convolutional neural network (CNN) to compare results with a deep learning database to pinpoint lesions. Currently, pupillometers are only adapted to check one eye at a time, but often there can be damage to a consensual reflex that goes unnoticed. Purdue researchers have fine-tuned their pupillometer to feature a telecentric lens that enhances biodynamic image acquisition and thereby allows optometrists to obtain highly accurate measurements for reliable diagnostics. In addition, researchers integrate an invisible infrared light source instead of traditional visible light to prevent artifacts from appearing in one's vision.

Advantages:

-Accurate

-Fast image acquisition

Potential Applications:

-Optometry

-Health Monitoring

Technology Validation:

Technology ID
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Category
Artificial Intelligence & Machine Learning/Computer Vision & Image Recognition

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Creation of a deep neural network (DNN) with 16 possible lesion identifiers, 15 of which are a positive result, to compare with real-time test results.

TRL: 1

Intellectual Property:

Provisional-Patent, 2019-01-02, United States | Utility Patent, 2019-11-07, United States

Keywords: Pupillometer, sensory motor function, optic nerve, oculomotor nerve, stem assessment, convolutional neural network, deep learning, pinpoint lesions, consensual reflex, telecentric lens, biodynamic image acquisition, infrared light source