

High-Performance Body-Mounted Brain Imaging System

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Categories:

- Biomedical Engineering
- Electrical Engineering

Keywords:

- Biomedical Engineering
- Brain activity
- Imaging
- Microscopy
- Neurons
- Suspension system

Researchers at Purdue University developed a body-mounted system for detecting animal brain activity with a large imaging depth and dual-region imaging capability. Traditional head-mounted two-photon microscopy (TPM) systems have imaging depth approximately 3 times lower than benchtop TPM and lack multiregional imaging ability. The Purdue researchers' invention provides images of the first five layers of neurons in the neocortex, which is a similar imaging depth to the TPM gold standard. Also, its dual-region imaging capability allows simultaneous monitoring of multiple brain regions to stimulus response. Additionally, using a weight- and torque-balanced system, the researchers were able to monitor the brain activity of freely moving mice. This technology provides more behavior scenarios to be analyzed than those allowable by traditional head-mounted systems. Finally, along with mice, imaging of the brains of larger animals like rats, cats, and monkeys can be accomplished with this system.

Technology Validation: The imaging depth in the Purdue researchers' systems is 700 microns, whereas the imaging depth in traditional head-mounted TPM systems is 200-300 microns.

Advantages:

- larger imaging depth than traditional head-mounted systems
- dual-region imaging capability
- detection of brain activity of freely moving animals
- brain monitoring of larger animals than allowable by traditional head-mounted systems
- lightweight
- high resolution images

Applications:

- monitoring brain activity of animals in real-time

People:

- Cui, Meng (Project leader)

Intellectual Property:

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Contact OTC:

Purdue Office of Technology Commercialization
The Convergence Center
101 Foundry Drive, Suite 2500
West Lafayette, IN 47906

Phone: (765) 588-3475

Fax: (765) 463-3486

Email: otcip@prf.org