Docket #: S24-048

Large-scale electrophysiology amplification platform (LEAP)

Stanford researchers have developed the Large-scale Electrophysiology Amplification Platform (LEAP), a wireless, label-free optical system for monitoring the electrical activity of neurons and heart cells. LEAP enables high-resolution, real-time recording without the need for invasive wiring or fluorescent dyes, making it safer and more scalable for both research and clinical applications

Traditional methods for tracking neural and cardiac activity often rely on microelectrode arrays or optical imaging with labeling dyes, both of which have limitations: wiring is cumbersome and hard to scale, while dyes can interfere with natural cell function and are not ideal for human use. LEAP solves these problems by using a nanofabricated photonic chip that detects cellular activity through changes in light reflection, eliminating the need for wires or labels. The compact chip can be easily integrated with standard microscopes and is suitable for use in both laboratory and medical settings.

Stage of Development: Research - in vitro

Applications

- Drug discovery and screening
- Neural monitoring in pharmaceutical trials
- Wireless intraoperative brain monitoring
- Epileptic brain tissue localization
- Brain-machine interface development for paralysis
- Stroke recovery monitoring

Advantages

- Wireless, free-space interface simplifies setup and enhances mobility
- Compact design integrates easily into existing workflows
- High-density, precise data
- Improved safety and human compatibility

Patents

- Published Application: 20250341750

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