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Image-guided Automatic Patch Clamp System

This image-guided system automates the patch clamp process, enabling high-throughput cell recording for efficient drug screening and statistical analysis.

One of the critical questions in neuroscience is how brain neural networks perform computations necessary for higher level cognitive functions. To answer this question, one needs to record electrical activity of individual neurons with synaptic resolution. The tool best suited to address this question is the whole-cell patch clamp technique, where multiple aspects of excitatory and inhibitory synaptic currents, cellular excitability, and interneuronal connectivity can be characterized. However, this method is slow and requires users with high levels of expertise.

Researchers at Purdue University have developed software that allows automatic patch-clamp recordings from individual neurons in a brain slice. They have also developed a pressure control prototype that together with a micromanipulator, allow the program to control the patch-clamp process. This technology uses computer vision to make this process completely automatic, requiring no human participation. Automatic image guidance makes the whole-cell patch clamp technique faster, easier to perform, and accessible for less experienced users.

Advantages:

-Faster

-Easier

-Extensive training is not required

Potential Applications:

-Brain neural network research

-Pharmaceutical testing

TRL: 4

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Category

Artificial Intelligence & Machine Learning/AI-Integrated Imaging Systems & Industrial Vision and Inspection

Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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