AI-Driven Zebrafish Behavioral Tracking for Psychiatric Drug Screening

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Overview

A high-resolution tracking system for analyzing complex individual zebrafish behaviors in an unconfined environment. By leveraging machine learning, this method provides an accurate model for drug screening with higher relevance to naturalistic behavior, particularly for psychiatric drugs.

Applications

- Studying natural behaviors in zebrafish
- Evaluate the effects of potential drugs for neurological conditions
- Enhance understanding of drug-induced neural mechanisms

Advantages

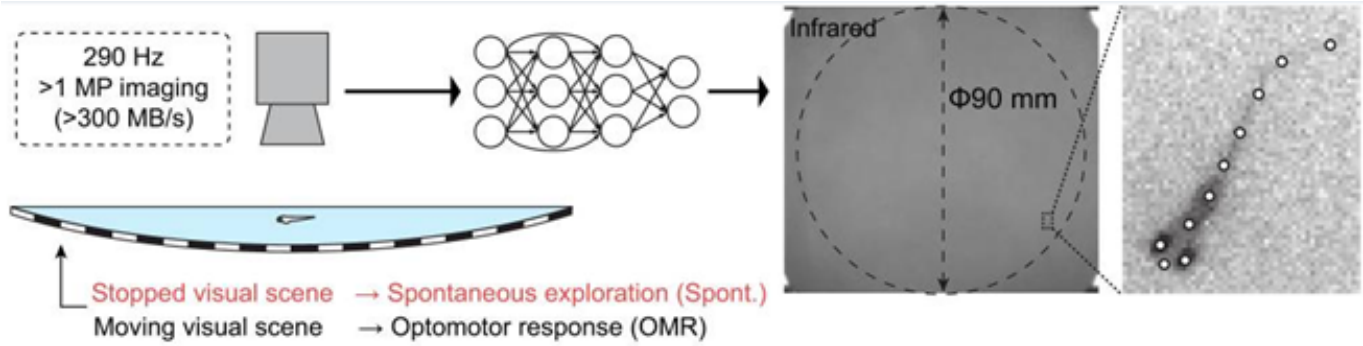
This method enables drug impact assessments in a more naturalistic setting, providing realistic insights into exploration, stress response, and other behaviors compared to confined chambers.

Stage of Development

The system has been validated with compounds like psilocybin, ketamine, and fluoxetine, demonstrating sensitivity to behavioral changes. Plans are underway to scale the system for multi-subject screening.

References

Braun, D. et al. High-resolution tracking of unconfined zebrafish behavior reveals stimulatory and anxiolytic effects of psilocybin. Mol. Psychiatry 29, 1046-1062 (2024). https://doi.org/10.1038/s41380-023-02391-7 [1].



Schematic of the experimental setup: Fish swam in an arena with projected visual stimuli. High-resolution images captured spontaneous exploration without stimuli and visually-induced optomotor response (OMR) with moving stimuli. A deep neural network analyzed the data to identify fish locations and body postures.

Patent Status

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