

NEUROTECHNOLOGY SYSTEM THAT UTILIZES SACCADES TO MONITOR AND ENHANCE HUMAN COGNITION

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Value Proposition: *Brain-computer interface for monitoring and modulating neural states based on saccade-related neural dynamics.*

Technology Description

Researchers at Washington University in St. Louis have developed a neurotechnology platform that monitors and modulates brain states using neural dynamics associated with saccades. The system provides both passive cognitive readiness tracking and active closed-loop neuromodulation to enhance visual encoding processes. It is modular and compatible with various invasive and non-invasive sensing and stimulation technologies, suitable for clinical, research, and consumer applications. Existing brain-computer interfaces (BCIs) focus on motor intent and do not account for dynamic cognitive states during natural behaviors.

This technology is the first system to leverage saccade-related neural dynamics for both monitoring and modulation, provides real-time detection of cognitive states conducive to visual information encoding, delivers targeted brain stimulation to induce optimal cognitive states, and is adaptable for non-invasive and wearable modalities.

Stage of Research

Initial validation with SEEG recordings from neurosurgical patients during active visual memory tasks has been completed. The potential for scaling to non-invasive and wearable modalities is currently being explored.

Publications

Tan G, Demarest P, Li Y, Cho H, Park H, Swift JR, Inman CS, Manns JR, Hamann SB, Liu X, Wahlstrom KL, Li Z, Hollearn MK, Campbell JM, Cettina PE, Sivakumar SS, Leuthardt EC, Willie JT, Brunner P. Mind's eye: Saccade-related evoked potentials support visual encoding in humans. medRxiv [Preprint]. 2025 Nov 15:2025.11.11.25339896. doi: 10.1101/2025.11.11.25339896. PMID: 41292659; PMCID: PMC12642748.

Applications

- Cognitive readiness tracking
- Neuromodulation

Key Advantages

- First system to leverage saccade-related neural dynamics for both monitoring and modulation
- Delivers targeted brain stimulation to induce optimal cognitive states for memory

- Identifies neural dynamic profiles associated with good memory using personalized behavioral and electrophysiological data
- Based on SEEG recordings, adaptable for non-invasive and wearable modalities
- Provides immediate feedback on cognitive readiness

Patents

Patent pending

Related Web Links – [Gansheng Tan Profile](#)