HandNBrain: A Hand Gesture Recognition Based Game Design for Elder's Cognitive Improvement

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Cognitive decline and fine motor skill deterioration are common in the aging process, contributing to diminished quality of life and increased dementia risk. This study introduces HandNBrain, an interactive hand gesture recognition game designed to stimulate both cognitive and fine motor functions in older adults. Unlike traditional interventions that typically focus on a single domain, HandNBrain integrates real-time virtual object manipulation tasks to engage multiple brain regions associated with memory, attention, perception, and motor coordination. The system includes three games—Quest for Apples, Bee or Mosquito, and Jump Master—each targeting distinct cognitive domains such as problem-solving, perceptual processing, and attention, while requiring precise hand movements. Evaluation involved expert interviews, system latency testing, and direct user trials. Experts noted the system’s alignment with cognitive rehabilitation principles and highlighted its potential to promote attention, memory, and reaction speed. Latency tests confirmed the platform’s responsiveness, ensuring smooth user interaction. Future work will focus on broader deployment via mobile platforms and the incorporation of whole-body interaction to enhance accessibility and preventive efficacy against dementia. These findings underscore the potential of gamified interventions in early-stage dementia prevention strategies.

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