ENGagement through Adaptive GamEs: Neurocognitive Training Intervention to Monitor Progress of Children with Attention Deficit

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Context & Need: Embedding Health & Education is a fundamental component of a humanitarian response. There is still a need when it comes to children with special needs. Professionals from health and education have long used play as a therapeutic tool for children with ADHD, mood and other disorders. For most children, first contact with computers is through some type of educational game. Adaptive Games is a vehicle through which children learn about themselves, the environment and develop social skills. However, for many children with any kind of impairment, adapted play opportunities are often limited.

Solution: Development of a therapeutic game for neurocognitive training. The following steps will be implemented:

- Measurement of attention levels via Brain-Computer Interface.
- Identification of periods of low concentration and correlate with the type of activity. Discover potential distractions (cause / effect).
- Machine learning techniques for: i) gesture control; ii) classification of concentration levels; iii) emotion via facial expressions.
- Assessment of acceptance, emotional reactions, levels of attention and possibly check progress in cognition and motor coordination.
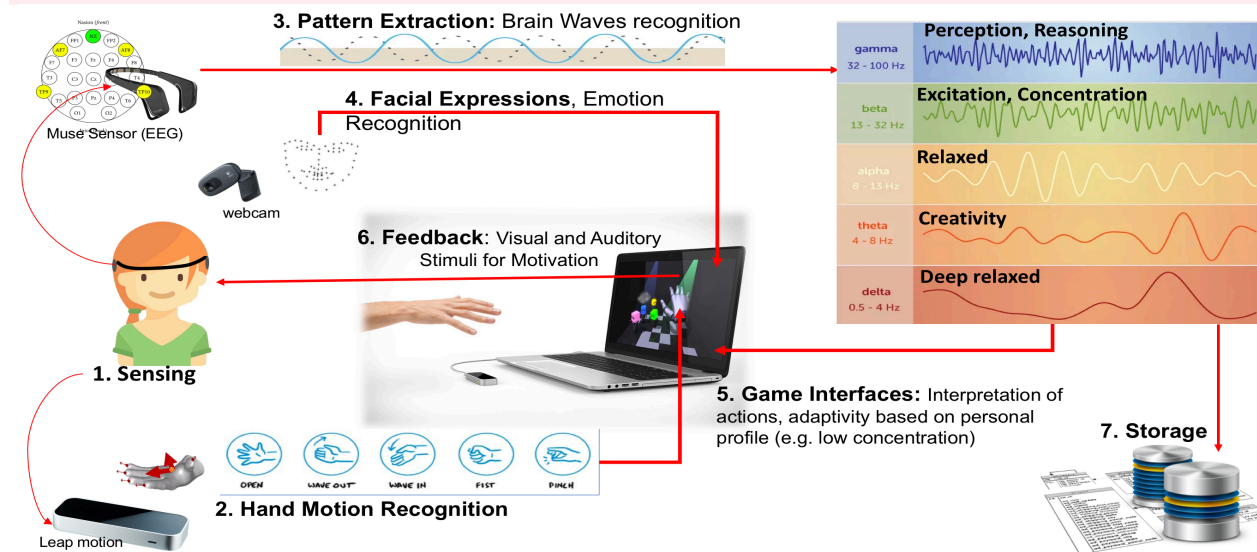
Project: This project will introduce an innovative intervention tool via an adaptive AI-based game for neurocognitive training to boost and maintain the concentration levels of children with intellectual disability and attention deficit. The educational therapy will assist the facilitation of adaptive learning-related coping and improved cognitive skill outcomes in educational settings. The application of technology to this intervention is a promising and ground-breaking avenue to promote adjustment and development in children, who tend to be increasingly enthusiastic about the use of technology.

3. **Pattern Extraction:** Brain Waves recognition

Muse Sensor (EEG)

4. **Facial Expressions**, Emotion Recognition

webcam

6. **Feedback**: Visual and Auditory Stimuli for Motivation

1. **Sensing**

5. **Game Interfaces:** Interpretation of actions, adaptivity based on personal profile (e.g. low concentration)

2. **Hand Motion Recognition**

Leap motion

7. **Storage**

gamma 32 - 100 Hz — **Perception, Reasoning**
beta 13 - 32 Hz — **Excitation, Concentration**
alpha 8 - 15 Hz — **Relaxed**
theta 4 - 8 Hz — **Creativity**
delta 0.5 - 4 Hz — **Deep relaxed**