

COMPUTERIZED COGNITIVE RETRAINING PROGRAM (CCRP) - PWA FOR CHILDREN WITH DISABILITIES

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Keywords:

Cognitive Retraining, Artificial Intelligence, Computer Vision, Emotion Recognition, Gesture Detection, Autism Support.

Introduction:

1. Children with developmental disabilities such as autism, ADHD, and learning disorders often face challenges in attention, memory, communication, and emotional understanding. Traditional therapy methods are often expensive, limited in availability, and require continuous professional supervision.
2. To address these challenges, this project proposes a **Computerized Cognitive Retraining Program (CCRP)**. The system integrates artificial intelligence and computer vision techniques such as emotion recognition, eye-blink detection, speech recognition, and gesture analysis to provide interactive and adaptive learning.
3. The platform, named *NeuroLearn*, delivers gamified cognitive training modules, enabling children to improve their cognitive and behavioural skills in an engaging and accessible manner.

Objectives:

1. To develop an AI-driven cognitive retraining system for children with disabilities.
2. To integrate modules such as emotion recognition, gesture learning, speech recognition, and blink detection.
3. To design interactive educational games to enhance memory, attention, and problem-solving skills.
4. To provide an accessible platform for parents, caregivers, and therapists for continuous monitoring and support.

Methodology:

The project follows a structured development approach:

- **Requirement Analysis:** Identify cognitive challenges in children and define system requirements.
- **System Design:** Design UI, architecture, and module flow for training activities.
- **Module Development:**
 - Emotion Recognition using deep learning
 - Gesture Detection using machine learning
 - Eye Blink Detection using computer vision

- Speech Recognition using APIs
- **Game Development:** Create interactive cognitive games such as shape sorting, sequence memory, and problem-solving tasks.
- **Database & Tracking:** Store user performance and generate progress reports.
- **Testing & Evaluation:** Validate usability, accuracy, and engagement with users.

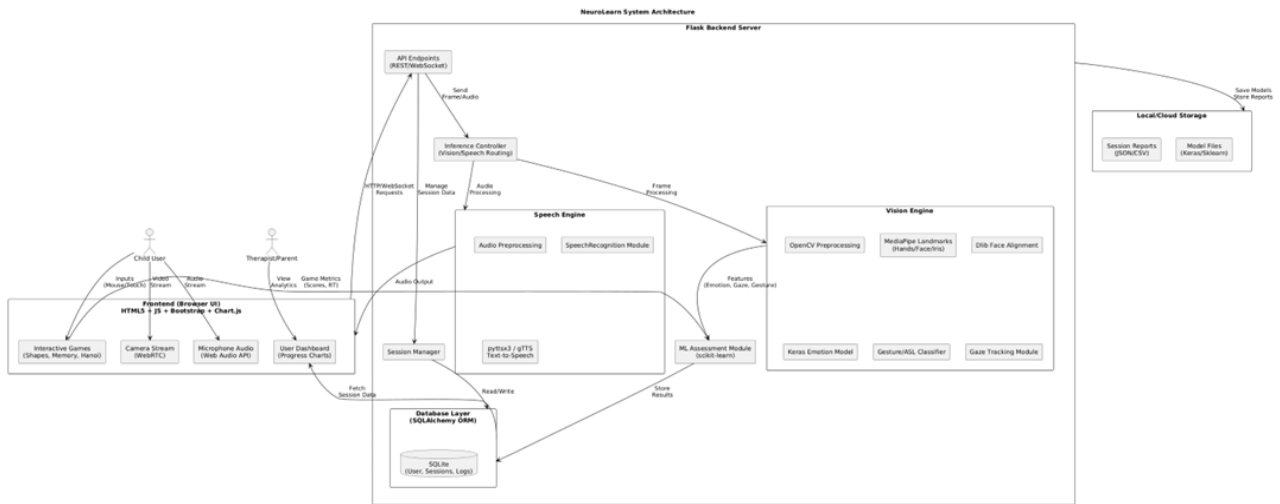


Figure 1: Architecture of the Project

Result and Conclusion:

In conclusion, the system provides an interactive and intelligent platform that enhances cognitive abilities such as attention, memory, emotional understanding, and communication skills in children with disabilities.

The integration of AI-driven modules and gamification improves engagement and learning outcomes. The system design ensures accessibility across devices, making it a cost-effective and scalable solution for cognitive rehabilitation.

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Future Scope:

The future scope of this project includes:

1. Integration of advanced deep learning models for improved accuracy.
2. Development of mobile app version with offline capabilities.
3. Collaboration with therapy centers for real-time deployment and validation.