KURAL: Knowledge-driven Universal Responsive AAC for Learners with ASD

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Abstract

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder affecting about 1% of the global child population, and approximately 1.47% in India. Individuals with ASD often struggle with verbal communication, leading to difficulties in expressing their needs and emotions. The inability to express oneself not only results in frustration but also hinders social integration and independence. This paper presents a novel, multimodal assistive system designed to enhance communication for Tamil-speaking children with ASD through visual, auditory, and interactive means. The system integrates a digital Picture Exchange Communication System (PECS) localized for Tamil, culturally adapted digital Tamil social stories, and wearable smart glasses. The PECS is an evidence-based augmentative alternative communication (AAC) tool widely used in special education to teach functional communication skills. The smart glasses reduce auditory overload by filtering background noise and delivering slow-paced speech, while the digital social stories provide visual narratives to improve socio-emotional understanding. By combining traditional methods with modern technology, the proposed system aims to establish two-way communication—enabling children to express themselves to others through PECS, while assisting them in understanding others' speech via smart glasses. This approach seeks to bridge the communication gap faced by children with ASD and provide them with a more inclusive environment.

Index Terms

Autism Spectrum Disorder (ASD), Augmentative and Alternative Communication (AAC), Picture Exchange Communication System (PECS)