eiBraille: Systematic Reform of Braille Education With AI & Low-Cost Tactile Technology for an Inclusive, Zero-Discrimination Society

Ponnirun, Punnawit (School: The Prince Royal's College)
Suwannahong, Siwakorn (School: The Prince Royal's College)
Thanapanyakul, Sataporn (School: The Prince Royal's College)

Braille illiteracy remains a critical barrier to equality for the visually impaired. Globally, over 70% face employment discrimination—not due to their disability, but due to systemic barriers that limit access to Braille education. Severe teacher shortages (10% access), outdated learning media, and prohibitively high costs ($6,000+) make Braille education inaccessible. As a result, fewer than 7% of blind youths are enrolled in schools, and under 10% achieve Braille literacy worldwide. eiBraille introduces a low-cost Braille display and AI-powered learning platform bridging global literacy gaps. Using STEAM principles, Phase 1 focused on developing a Braille display with a patented retractable pin mechanism, reducing production costs by over 40× to $100 while maintaining 100% actuation across 50,000 cycles. Paired with an IoT-integrated Braille decoding algorithm, the system achieved 96% real-time transmission accuracy, validated with randomized datasets. In Phase 2, we enhanced an AI-powered virtual Braille instructor, built on a fine-tuned, curriculum-aligned LLaMA 3.1 model. In trials with visually impaired learners, the system enabled 9× faster independent learning than traditional methods—reducing Braille mastery time from 3 years to 6 months. A vibrant platform empowers parents and teachers to support progress, turning every milestone into a celebration of growth. Through outreach and support clubs in Thailand, eiBraille expands access to STEAM and creative learning. Through reducing cost by 40×, accelerating learning by 9×, and enhancing AI, eiBraille transforms Braille literacy—making assistive technology accessible to all visually impaired individuals in all languages, transforming lives globally, and advancing an inclusive, zero-discrimination society.

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