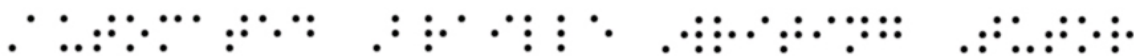


Automated Braille Writing Tutor

A TechBridgeWorld Program Seeking to Improve Literacy Among Visually-Impaired Youth



Motivation & Design

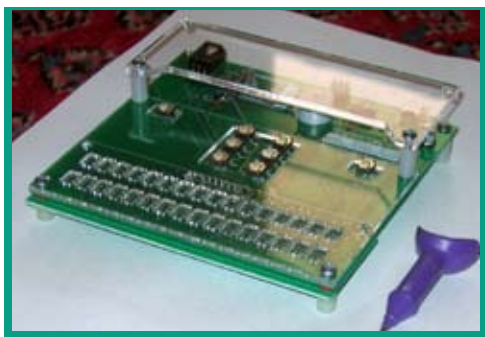
About 87% percent of the world's 314 million blind and visually impaired people live in developing communities, according to the World Health Organization. Despite the importance of literacy to employment, social well-being, and health, experts estimate the literacy rate of this population to be under 3 percent.

In developing communities, braille is almost always written with a slate and stylus. For blind children, learning to write braille in this manner can be a formidable process as they: (1) must learn mirror images of the letters, (2) may not have the individual guidance they need, (3) experience delayed feedback, and (4) must use limited or expensive paper supplies.



Through vital feedback from our partners and creative energy of student and faculty researchers at Carnegie Mellon University, TechBridgeWorld developed a unique device for braille writing practice. The Braille Writing Tutor consists of an electronic slate and stylus that is connected to a computer through a USB cable. As the student writes each letter on the slate with the stylus, the tutor provides immediate audio feedback by repeating the written letters and words. In turn, it also guides writing and correct mistakes. The tutor has many modes where children can learn how to write, practice writing, and be quizzed on letters and words. It also has modes for educational games. The Braille Writing Tutor and its accompanying software are intended to complement instruction provided by teachers as a practice tool for individuals beginning to learn braille writing.

Project Goals



- Design, implement, and test an automated braille writing tutor with partner organizations in developing communities
- Develop a braille writing tutor based on the slate and stylus method which is commonly used in developing communities
- Create a robust, low-cost, and low-power braille writing tutor using a digital stylus that interfaces to a computer, PDA, or SimPuter interface
- Use text-to-speech software to provide immediate audio feedback to guide students' writing and correct mistakes at different learning levels

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“There are many jobs where you create technology without knowing why you are doing it or who the end user of your product is. I was able to see the end results of all my work directly in the field. My immediate feedback would be the joy on the faces of the children enjoying a game on the Braille Writing Tutor.”

*Saurabh Sanghvi, Electrical and Computer Engineering student,
upon completing summer2008 field study
with the Mathru School for the Blind*

Project Details



The Automated Braille Writing Tutor Project started as two V-Unit independent study projects under TechBridgeWorld in the spring of 2006. Two Robotics Ph.D. students, with the guidance of several Carnegie Mellon faculty members, designed, developed, and field tested the tutor in partnership with the Mathru School for the Blind in India. Initial feedback was collected from visually-impaired individuals in the Pittsburgh, Pennsylvania area. The initial field study, carried out over six weeks in the summer of 2006, explored the feasibility of the tutor in a real educational setting with visually impaired students and

teachers. The teachers and students were highly enthusiastic about the project and provided valuable suggestions for future improvements.

Since that initial testing period, additional undergraduate and graduate students at the Carnegie Mellon campuses in Pittsburgh, United States and Doha, Qatar have become engaged with the project, working to improve the hardware and software that visually-impaired use to learn to write braille.

Carnegie Mellon students, faculty, and staff continue to work on improving and enhancing the Braille Writing Tutor. It is now functional in English, Arabic, Bangla, Chinese, French, and Swahili braille, can offer six modes of instruction and exercises, and offers several educational game options. The tutor has been field tested twice at the Mathru School and we have collected feedback from schools and institutions in the United States, Bangladesh, China, Qatar, Tanzania, and Zambia. We are currently exploring additional games and activities to add to the Braille Writing Tutor, and to make it a battery-powered standalone device.

Key Research Questions

- Is implementing the tutor feasible in developing communities?
- How do environmental limitations affect design?
- Which learning techniques facilitate automated responses from the tutor?
- What types of feedback do users of the tutor respond to best?
- Can the Braille Writing Tutor be expanded beyond just being a writing tutor?



Sponsorship

Generous support has helped this program grow from a V-Unit project to a full TechBridgeWorld program! Sponsor funding has made all of the research and testing of the Braille Writing Tutor possible. Collaboration from a research agency, an under-resourced school, and industry partners adds value to your investment in this project.