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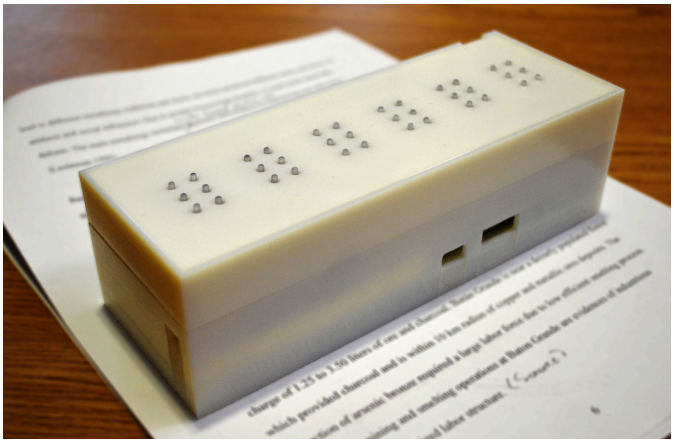
Tactile: A Portable, Real-Time Text-to-Braille Converter

The Challenge: We live in the Information Age, yet less than one percent of all text documents are translated into braille, the long-standing system that allows blind and other visually impaired people to read via patterns of raised dots that they touch with their fingertips. This means much of the text that surrounds us—from pamphlets and brochures to words on packaging—will never appear in braille. In addition, the limited number of braille books that do exist can be difficult to access because they're available only at a few specialty stories, public libraries, or nonprofit organizations.



Only 10 percent of visually impaired people in the United States are braille literate, in part because of high costs and limited availability of braille resources. However, research shows that braille readers typically achieve higher levels of education and employment.[1]

Existing braille devices can produce braille and audio translations from electronic documents, but they can't read printed text. Text-to-speech and other audio technologies can sometimes be disruptive, and wearing headphones for privacy may be seen as unprofessional. Current refreshable braille display devices, which are typically priced in the thousands of dollars are simply beyond the means of the 60 percent of visually impaired people worldwide who live in low-income settings, according to the World Health Organization (WHO). Finally, most educational institutions choose to spend their limited funds for resources elsewhere, further discouraging braille literacy.

The Solution: Tactile is an inexpensive, portable real-time text-to-braille scanner with a refreshable handheld pin display that could enable the 7.3 million visually impaired people in the United States to read any block of printed text without listening to an audio translation. The team built an initial prototype during the annual MakeMIT hardware hackathon, where it won first place in the intense competition. Multiple cameras built into the bottom of the Tactile device can scan any text, whether from a book page, a restaurant menu, or a pamphlet. Tactile stitches the images together and transmits the data to a nearby smartphone via Bluetooth for image processing and text recognition. The phone sends the interpreted information back to Tactile's refreshable display, consisting of two rows of magnetically actuated braille blocks on the top of the device, which is about the size of a candy bar. The pins in each cellblock move up and down to form braille characters.

[1] https://nfb.org/images/nfb/publications/jbir/jbir13/jbir030101.html

Commercialization: Using an electromagnetic mechanism rather than a conventional piezoelectric mechanism will drive down the cost of each cell in the cell block from the current range of $20 to $36 to a projected $3. The team intends to market a 20-cell Tactile device for $500 or less. The team believes making Tactile affordable for low-income people and educational institutions will help decrease prices for braille technology in general and, in the long term, increase overall rates of braille literacy. Tactile has a patent pending through Microsoft's #MakeWhatsNext Patent Program, which encourages more female inventors. The team is collaborating with local members and organizations for the visually impaired, such as Carroll Center for the Blind, Perkins School for the Blind, and National Braille Press. The team has already begun discussions with manufacturers and plans to optimize the prototype for production moving forward.