Engineer produces free Braille-writer app

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A touchscreen Braille app undergoes testing in Sri Lanka.

Three years ago, Sohan Dharmaraja was a Stanford engineering doctoral candidate in search of his next project when he visited the Stanford Office of Accessible Education, which helps blind and visually challenged students successfully navigate the world of higher education.

He was getting ready to become a mentor in a summer programming course for undergraduate students, an event organized by the Army High

Performance Computing Research Center at Stanford.

The only charge handed down by the course organizers, Dharmaraja recalled, was to "do something on a tablet."

He noted, "The people in the Office of Accessible Education were perplexed about why I was there. Visual impairment and tablets don't obviously go together, but when they showed me a Brailler – the laptop-like computer that the blind use to type documents – I said, 'that's it!' And the rest just fell in place."

A Brailler is an indispensable tool to blind and visually impaired people, allowing them to type documents and notes, and to send and receive email.

Building a prototype

Dharmaraja teamed with Adrian Lew, a Stanford associate professor of mechanical engineering, and Adam Duran from New Mexico State University to create the prototype flat-screen Brailler. That prototype, created in two months, caught the world's attention, making headlines from Wired to the BBC.

It is a long journey from a simple albeit exciting prototype developed quickly in a summer course to a finished app that's ready for the prime time of the hyper-competitive app store.

Though it has taken Dharmaraja and Lew a couple of years to hone, test and perfect their creation, the full-blown iPad app, known as iBrailler Notes, is now available to the world. The basic version of the app is free.

"Creating a prototype is relatively easy when your audience is a handful of fellow classmates. We did it almost as a whim to see if we could do

it," Dharmaraja said. "But creating a real app, that potentially millions might rely upon every day, is a whole other ballgame."

Lew added, "We think the time was well-spent to get it right."

Compared to the remarkable breadth of capabilities of most tablets and smartphones, a Brailler is relatively narrow in function, and most cost thousands of dollars. Now, with an iPad and an app, the blind have capabilities many never dreamed possible.

Typing is only a third of what people really want to do on a computer, Dharmaraja said. Ideally, the user would be able to not only create documents, but to edit, cut, paste, and move pieces of text around, as well. In a big, multi-page document, that is not an easy thing to do, even for a sighted person.

"We constantly pushed ourselves to innovate because being born with a disability shouldn't mean you get left out of today's technology revolution," Dharmaraja said. "When you see the smile of someone doing something that you and I take for granted, it's motivating."

One of the biggest benefits of iBrailler Notes is how the keyboard works. To locate keys, users simply hold their fingertips anywhere on the glass surface of an iPad – the iBrailler then draws the keys around the fingers.

Fast, multiple formats

Like a traditional Braille writer, iBrailler Notes uses a series of eight keys – one for each fingertip. If the user gets disoriented and loses track of the keys, recalibration is as easy as lifting the hands off the glass and putting them down again. The app will again automatically orient the keys to the fingertips.

Other advanced features include a clever undo/redo function that requires a simple clockwise or counterclockwise twist of a single fingertip against the glass. There's one-click Google access. Using the iPad's accessibility tools, iBrailler Notes provides search results by speech for users who would otherwise have no way to read the results.

The app also accommodates multiple Braille formats, including mathematics and scientific as well as other languages. Braille systems the world over are notoriously complex – there is no single standard. Every country, every language, every profession has its own way of doing things.

"The iBrailler is the fastest, most capable Braille writer out there," Lew said.

In almost every way, the app is unrecognizable from the raw prototype Dharmaraja and Lew demonstrated to a stunned crowd at Stanford a few years ago. Everything has been re-thought from the bottom up.

Coding well-vetted

Soon after the summer course ended, Dharmaraja earned his doctorate and returned to his native Sri Lanka to work on the app, which he then dubbed Brailler Notes. He became a fledgling CEO and quickly hired a team of blind and visually impaired Sri Lankans to be his testers. This team was no ordinary group of testers, however. An average blind person in the West has had at least some introduction to technology, but not so in Sri Lanka.

"Our testers did not know what a tablet computer or a touchscreen was, much less how to use them. We had to teach them how to use a touchscreen before they could tell us how to improve our products," Dharmaraja said.

This turned out to be a good thing for the development team members. When they wrote code, they'd have the testers try it on the tablets. The testers would then provide feedback, often in no uncertain terms.

"We'd proudly hand some new code over and they'd promptly tell us it was, well, not very good, only they used different terminology," Dharmaraja said with a laugh.

In creating the iBrailler, the team had help from testers at San Francisco's Lighthouse for the Blind and Visually Impaired and a testing group from the Employers Federation of Ceylon. The project also received support from the National Science Foundation of Sri Lanka.

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