

Undergraduates Devise Inexpensive Hand-held Braille Writer

July 25 2006



Johns Hopkins undergraduates designed this low-cost Braille writer, which is used to make up to six indentations in each cell of a Braille slate. Credit: Will Kirk/JHU

To help provide a low-cost communication tool for blind people, undergraduates at The Johns Hopkins University have invented a lightweight, portable Braille writing device that requires no electronic components.

For a class called Engineering Design Project, four mechanical engineering majors were asked to produce such an instrument that would cost less than \$50 each. The more sophisticated and generally more cumbersome typewriter-style or computer-based Braille writers available

to blind people typically cost much more.

At the end of a two-semester research, design and testing process, the student inventors came in well below the target price. They estimated that their Braille writer, if mass-produced, would cost about \$10 each in an easy-to-assemble kit. The team members recently presented their prototype to the project's sponsor, the Baltimore-based National Federation of the Blind.

“We were looking for a portable writing device that's low-tech and does not use a computer,” said Marc Maurer, president of the National Federation of the Blind, who has tried out the prototype. “We want to give credit to these students. They did an outstanding job. This was definitely a good proof-of-concept.”

Betsy Zaborowski, executive director of the federation's Jernigan Institute, said, “The Jernigan Institute is committed to the development of innovative tools for the blind. The collaboration with Johns Hopkins' Whiting School of Engineering on this project has been very valuable, and we look forward to additional collaborations in the future.”

Federation officials said that although the prototype does not perform perfectly, it includes a number of innovative features, such as a button mechanism to create multiple Braille impressions. Organization leaders say the students' prototype can serve as a key starting point in the group's plan to develop and distribute a low-cost, low-tech Braille writer. Leaders of the federation, which has 50,000 members around the United States, believe such a device could assist many people in this nation and around the world who cannot afford more expensive writing tools.

To keep assembly and maintenance costs low, the hand-held writer invented by the Johns Hopkins students operates in a purely mechanical fashion. It features six buttons that can be depressed to produce any of

the embossed patterns that correspond to a Braille letter, number or punctuation mark. The device is used with a traditional Braille slate that features rows of rectangular openings or “cells.” When a piece of paper is inserted into the slate, the device can insert one Braille letter or number into each cell. Normally, a blind person uses a stylus to poke up to six indentations into each cell, forming one bump at a time. The students’ device uses metal pins to emboss up to six marks at once, which could speed up the writing process. Because the buttons are close together, a single finger can depress more than one.

Presenting the prototype to the federation marked the end of a challenging lesson in applied engineering for students Emily Kumpel, 22, of Wakefield, Mass.; Peter Lillehoj, 22, of West Friendship, Md.; Mark MacLeod, 23, of Ipswich, Mass.; and Penny Robinson, 22, of Baltimore. Kumpel and Lillehoj recently graduated; MacLeod and Robinson expect to finish their undergraduate studies in December.

When the students began the project, they decided that a six-pin hand-held unit would be more compact and more economical than a keyboard-style Braille writer. Their first prototype demonstrated that the concept was sound, but the unit didn’t feel comfortable in the hand, so they produced a second that was superior mechanically and ergonomically. They have given their sponsor plans for a further improved model that will possess a sturdier case and modifications to keep the pins from sticking.

Robinson, who tracked expenditures, said the students had to work within a budget of \$9,000. “We spent no more than \$5,000, most of it on machining costs,” she said. “We did a really good job at coming in at a low price. And it was very rewarding. It wasn’t just a project to benefit a company. It was a project that could benefit real people who need to improve their literacy rate.”

MacLeod, who handled much of the computer-aided design work, said the assignment forced the team members to think about how the device would be used by people who could not see it. “We had to put ourselves in their shoes,” he said. “We had to remember that this is their disability. How do we solve the design problems with that in mind? But this was a great learning experience overall. It was exactly what I needed for my education, that hands-on stuff.”

Lillehoj said he was most proud of the fact that the team designed a Braille writer that operates in an entirely new way. “We ran into some small problems with some parts of the mechanism, but we were able to come up with solutions to almost all of them,” he said. “I thought it was neat that our team was able to come up with this new design that produces Braille through this method. I don’t think it will take that long to train people to use it, especially children.”

Kumpel said she learned the importance of friendly collaboration. “Every member of our team was absolutely integral to the success of the project,” she said. “We learned how to make sure everyone was involved in decisions about the design and whichever tasks were necessary, as well as how to balance our schedules and workload. We weren't afraid to ask each other for help or to ask for advice. When we were going through the many, many iterations of the design, every one of us had something to add to improve the final result.”

Producing the portable Braille writer was one of nine Johns Hopkins projects completed this year by undergraduates in the engineering design course. The class is taught by Andrew F. Conn, a Johns Hopkins graduate with more than 30 years of experience in public and private research and development. Each team of three or four students, usually working within budgets of up to \$12,000, had to design a device, purchase or fabricate the parts and assemble the final product. Corporations, government agencies and nonprofit groups provide the

assignments and collaborate with the students. The course is traditionally a well-received hands-on engineering experience for Johns Hopkins undergraduates.

Source: Johns Hopkins University

Citation: Undergraduates Devise Inexpensive Hand-held Braille Writer (2006, July 25) retrieved 28 April 2024 from <https://phys.org/news/2006-07-undergraduates-inexpensive-hand-held-braille-writer.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.