BRAILLE USING IOT FOR BLIND PEOPLE

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Abstract–In this project, a cutting-edge method for facilitating Braille learning with a Raspberry Pi-based system is presented. The goal is to provide a user-friendly, interactive platform that makes it possible for those who are blind to learn Braille efficiently. The system has a tactile interface that dynamically generates Braille characters and gives users immediate feedback. A refreshable Braille display displays the corresponding Braille characters created by the Raspberry Pi using input from a Braille keyboard. The Braille characters can also be heard being spoken by using the audio output option. The project is appropriate for people with minimal means due to its user-friendly design and affordability. The technology may improve Braille literacy among the visually impaired, according to promising results from preliminary research with individuals who were blind.

KEYWORDS: Raspberry pi 3, Pcb prototype board, Push buttons, Keyboard, Braille, espeak.

1 INTRODUCTION-Although it is true that computers have not yet made it to normal schools in India's rural and outlying regions, teaching visually impaired youngsters how to use them seems improbable. A visual impairment causes virtual isolation from the community for many youngsters in India. These young people struggle to succeed in life and frequently forgo their schooling in favour of jobs that, at best, provide them with a meagre daily allowance. It has been astounding to see how enthusiastically the engineering community has reacted to the idea of expanding "Assistive Technologies"' theories and concepts. In the industrialized world, unique facilities are provided to assist the disabled in moving around and working in structures without severely relying on outside assistance. Products that significantly aid the disabled in coping with their unique infirmities have been made possible by technological advancements, particularly in the domains of precision manufacturing and electronics.

According to some, the situation in India is different for two main causes.
1. The majority of people, especially those who live in rural or distant locations, cannot afford technology.
2. Lack of or limited proficiency with Braille Script for English or any other language, which is necessary to keep up with the rapidly advancing technologies.
We have developed a method to improve the education of visually impaired youngsters in their formative years. Teaching the Braille script to visually impaired children is an elementary task in the early stages of education.
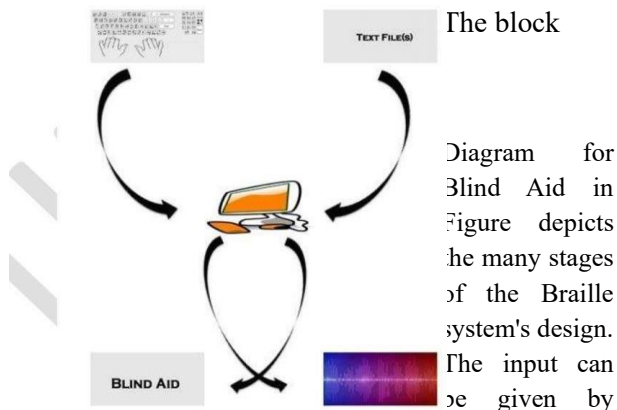
2 LITERATURE SURVEY

2.1RELATED BACKROUND STUDY

2.1.1 Literature Review-For those who are blind or visually impaired, a variety of technologies are available on the market to aid in educational pursuits and to close the communication gap with those who can see. The most common assistive technology for people with visual impairments is Speech Assisted Learning (SAL), which costs approximately $4,600. Other popular options include Book Sense Reader ($499), Eye-Pal Reader ($1,995), Eye-Pal ROL ($2,195), and Eye-Pal Reader ($1,995). Electronic Braille pad, automatic electronic pen, automatic translation from visual to tactile, interactive 3D Sound Hyper tales for Blind Children, and a PC-based Braille library system for the blind. The World Health Organization (WHO) reports that 90% of the world's visually impaired people reside in developing nations, the majority of whom make less than $1.25 per day and therefore cannot afford the assistive technology that is currently available on the market.

The majority of products on the market are either Braille writing tutors or Braille scanners, but there isn't a low-cost Braille system available for visually impaired people living in developing nations that can teach Braille writing and reading without the help of a Braille teacher.

Blind Assistance: An Interactive Assistive technology for the visually impaired, the Braille System for Visually Impaired is the only Braille system that is inexpensive, low-power, portable, self-learning, and user-friendly. It also has the ability to read documents and uses text-to-speech technology.

2.1.2 Braille System Implementation Methodology

The block Diagram for Blind Aid in Figure depicts the many stages of the Braille system's design. The input can be given by either inputting text files or typing on the available Braille keyboard. Both novice and expert users can use the intended Braille keyboard for typing because it supports all Braille International Journal of Engineering Research and General Science Volume 2, Issue 4, June-July, 2014 ISSN 2091-2730 644 www.ijergs.org system encoding levels. The computer then processes the Braille keyboard-entered characters or sentences as well as any text files that were inserted. The Braille character sets are then translated into the English alphabet, numerals, and punctuation by the developed Braille system. The final output is shown as text on the computer screen and as speech when text-to-speech synthesis is used. The Braille system is created with the capacity to read documents, thus any paragraphs or entire texts that are inserted are processed by the system and spoken output is generated. The Braille system that was created is an intelligent system that anticipates the entering characters or words and determines automatically whether the input is a character or a word before producing the spoken output in accordance. The developed Braille system stands apart from other text-to-speech Braille systems that are currently on the market since it also produces spoken output in character form.

3 IMPLEMENTATION

3.1 Raspberry PI 3 model

The Raspberry Pi is a credit card-sized, open-source, Linux-based computer board that was developed by the Raspberry Pi Foundation. The Pi is a fun and convenient way for people of all ages to develop their computer and programming skills. The Raspberry Pi can perform many tasks that a desktop computer can, including playing video and surfing the internet, by connecting to your TV or monitor and a keyboard. The Pi is also excellent for cutting-edge ideas that you want to try out; newer models' processing capability makes them perfect for Internet of Things projects. Wireless LAN and Bluetooth Low Energy are also included with the Pi 3. The Raspberry Pi has just improved! Wi-Fi, Bluetooth, and a Quad-Core 64-bit CPU are now included. The third-generation Raspberry Pi is the Raspberry Pi 3 Model B. This robust single board computer, which is the size of a credit card, replaces the Raspberry Pi Model B+ and Raspberry Pi 2 Model B and may be used for a variety of tasks. The Raspberry Pi 3 Model B offers you a more potent processor that is 10x faster than the Raspberry Pi of the first generation while preserving the well-liked board size. It also includes wireless LAN and Bluetooth connectivity, which makes it the perfect choice for robust linked designs.

4 TESTING

Software testing entails running a software or system component to assess one or more valuable properties. The degree to which the component or system under test:

• satisfies the specifications that guided its design and development.

• responds correctly to all types of inputs.

• performs its functions within an acceptable time.

• is sufficiently usable.

• can be installed and run in its intended environments.

• Achieves the overall result that its stakeholders desire is generally indicated by these properties. Unit testing, integration testing, validation testing, and output testing are the testing steps.

4.1 Unit Testing-In order to lower the risks, expenses, and duration of software development, unit testing is a software development method that comprises the coordinated use of a wide range of defect prevention and detection strategies.

Function Name	Tests Results
Pressing the Braille code in Braille Plate	Speaker spells the pressed Alphabet or word
Pressing the wrong Braille code in Braille Plate	Speaker spells to re-type the alphabet orword
Get BBC news	Tested if the news is broadcast successfully in speaker in real-time.

Table 6.1: Unit Testing

4.2 INTEGRATION TESTING-Defects in the interfaces and communication between integrated components (modules) are revealed through integration testing. Up until the software functions as a system, ever-larger groupings of tested software components that match to components of the architectural design are merged and tested.

5 CONCLUSION

For people who are blind, a reading and writing method called braille has been created. The focus was on how difficult it is to teach blind people at first, how much additional training is needed, and how expensive and time-consuming it is to translate Braille into text. Our Braille Keypad is a low-cost, practical, and user-friendly tool that can help a lot of blind students who live in impoverished countries with their education and also help the blind gain more work prospects. The Keypad is an effort to use technology to help blind students learn.

6 FUTURE ENHANCEMENTS

The Braille learning with Raspberry Pi project aims to develop an interactive and cost-effective system for blind people to learn Braille. The program has a tactile interface that instantly generates Braille characters at the fingers of learners. It is made with multilingual capabilities, gamified learning aspects, and Braille grade improvement in mind. The technology can tailor the learning process for each user by offering adaptive learning and cloud-based progress tracking. Future work will include investigating haptic feedback improvements, incorporating Braille resources, and working with educational organizations. This project is a key step towards empowering visually impaired people with fundamental Braille literacy skills and encouraging inclusion.

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