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Android Based Braille Tutor System for Visually Impaired People

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ABSTRACT

Visually impaired students (VIS) are unable to get visual information, which has made their learning process complicated. This paper discusses the overall situation of VIS and identifies major challenges that they are facing in getting education. The Braille system is followed to educate blind students. However, lack of Braille based educational resources and technological solutions have made the learning process lengthy and complicated for VIS. As a developing country, most of the people cannot afford for the costly Braille related technological tools for VIS. Therefore, a mobile phone based Braille Tutor System, for Android platform is designed to provide an easy Braille learning technology for VIS. The main objective of the project is to create a low cost, economical presentation device and Braille tutor system based on Android for the blind. The project uses An Android Application which acts as a tutor at sender side and server side system which receives the data and converts to text to speech and even displays it in graphical manner at the Receiver Side. The Text can also covert into speech at the Receiver Side. Tutor App for visually impaired is a device that can be used by blind for two major purposes i.e. Note Taker, Electronic Braille Tutor System.

Keywords : Android platform, Braille Tutor System, Voice to Text Conversion, Braille Converter, Text-To-Speech Translator, Visual Impaired People Education for VIS.

I. INTRODUCTION

In 2008, The World Health Organization (WHO) estimates that there are approximately 161 million people with severe vision loss worldwide. A generation ago 50 percent of blind school children used Braille. Now, it's less than 12 percent. Hence, in a vision to increase the percentage of Blind people studying Braille in a interactive way, this device is being developed

Braille is a tactile writing system used by people who are blind or visually impaired. It is traditionally written with embossed paper. Braille-users can read computer screens and other electronic supports thanks to refreshable braille displays. They can write braille with the original slate and stylus or type it on a braille writer, such as a portable braille note-taker, or on a computer that prints with a braille embosser.

This paper is a very important need in today's world. It can be used to make examination experience easy for visually impaired people. This is better than many other options available till date for visually challenged people. Making use of Braille, Providing human support and giving extra time to complete the same task are some available methods to help visually impaired people to take the tests. This paper will help innovate a new way that will help blind and visually impaired people to take the test on their own without using anyone's help. The key focus of application is to provide students with an ability to interact with the system through speech. The application automates the examination process through reading out questions to the user and receiving their input orally. Technology of voice recognition will be used for solving the tests.

Hence this application will allow visually impaired people to appear for test in more convenient and efficient way.

II. Research Motivations and Problem Definition About Braille and Proposed Research Methodology

Braille is writing system which enables blind and partially sighted people to read and write through touch. It was invented by Louis Braille (1809-1852), who was blind and became a teacher of the blind. It consists of patterns of raised dots arranged in cells of up to six dots in a 3 x 2 configuration. Each cell represents a letter, numeral or punctuation mark. Some frequently used words and letter combinations also have their own single cell patterns. Braille can be seen as the world's first binary encoding scheme for representing the characters of a writing system. The system as originally invented by Braille consists of two parts:

i) A character encoding for mapping characters of the French language to tuples of six bits or dots.

ii) A way of representing six-bit characters as raised dots in a Braille cell.

Problem Statement:

The main aim of this paper is to propose a system that uses speech technology to provide students with access to information during exams. The key focus of application is to provide students with an ability to interact with the system through speech. The application automates the examination process through reading out questions to the user and receiving their input orally. Application also provides accessories for other requirements, like knowing the time remaining, during exams.

Use of this application shall benefit students with:

- Learning disabilities, including dyslexia and dysgraphia
- Poor or limited motor skills
- Vision impairments
- Physical disabilities
- Limited English Language
- The application will help the students with reading writing disabilities
- as well as sensory disabilities

III. Proposed System and Methodology System Design and Architecture

The proposed project work is to create a low cost, economical Presentational device and Android Based Braille tutor system for the blind. The proposed system will involve 2 Major Module 1)An Android Based Tutor System. 2)A Java Server System.

1.Android Tutor System: It will be an android application which will have a login credentials and further 2 different modes of operations. Those are Auto Mode System and User Mode System. An **Auto Mode System** in which the Application will be sending each Alphanumeric Letters in a sequence to the Embedded Interpreter along with voice notifications further, the Receiver module will interpret the received Character in a Braille Pattern. An **User Mode System**, in which the tutor or the teacher will speak out a word say Good Luck, which will be synthesized from voice to text and each letter of the sentence spoken will be sent in sequence with some gap and the receiver Embedded system will present each letter sequence in the Braille Pattern along with the voice notification.

2.A Java Server System : It's Design using Java (Socket Server) having all interface and other components like Bluetooth required to complete the system. An Server System which acts as a receiver for the Tutor App

using Bluetooth as a medium and presents the Braille Matching sequence of each incoming word.

System design and Architecture:

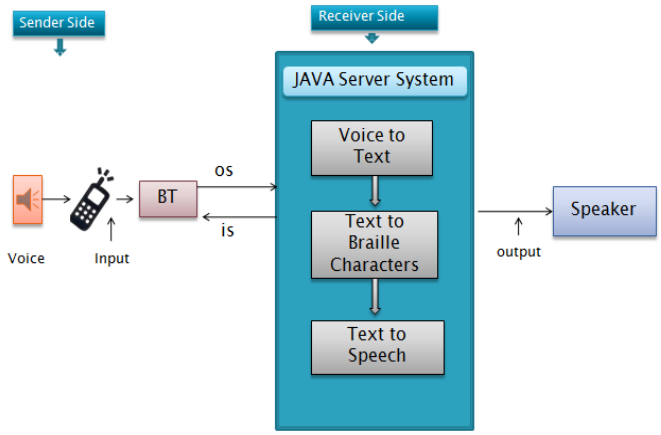


Fig.1. Block diagram of Braille Tutor System

The architecture of our proposed system is depicted in fig.1. The diagram shows major component of present system which are:

- Android Smart Phone.
- 512MB or 1GB RAM.
- GPRS, Bluetooth Supported.
- System with Minimum Pentium 4 Processor.
- Ram Minimum 4GB.
- Front-End:-Java, xml, Android Studio, Net-Beans IDE
- Back-End:-SqlServer, Sqllite.

In the Braille System architecture will give the conversion of text to Braille characters using Java. The user will send the data which is in the form of text. The text form will convert into Braille characters using Braille transcription. The transcription will fetch the data from the database. The transcription will convert the text to Braille characters & this converted data will be displayed on the window .The received data is again convert into speech at the Receiver Side.

4.3 Flowchart

The following flow chart will give the complete process of Proposed Tutor System

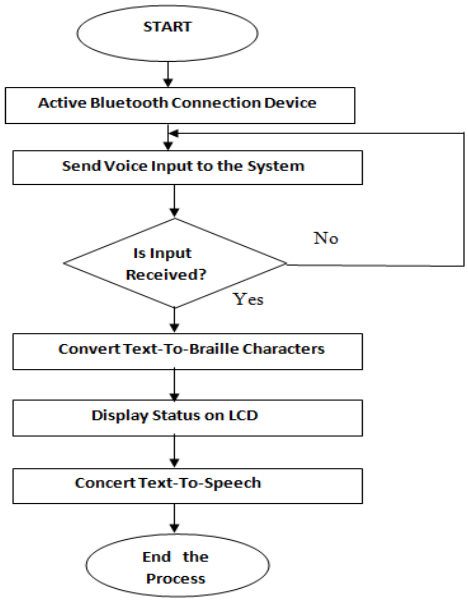


Fig.2. Flow chart of an Android based Braille Tutor System

Processing Steps of our proposed System:

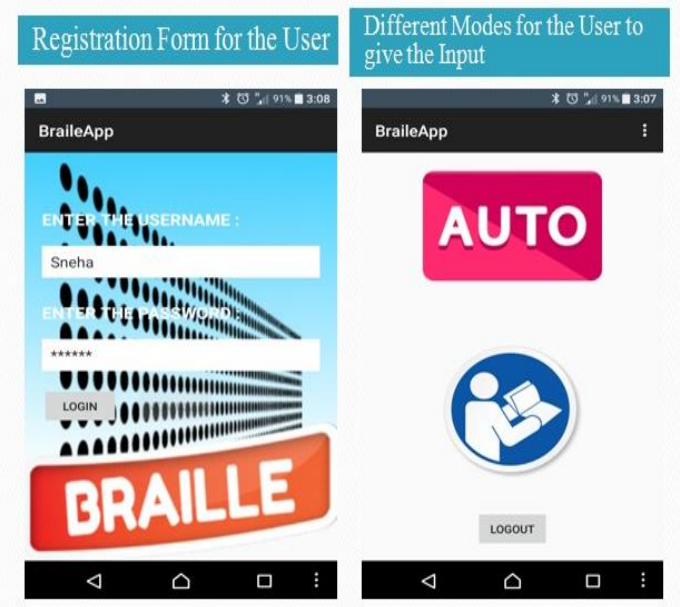
- The main process will start with an Android application . User need to send Voice as an input to the system through Bluetooth device.
- Activate the Bluetooth device while sending an input .
- Check the condition whether the input is received by the system or no.
- If the info is appropriately sent to the framework, at that point framework will get Instant message as information.
- The received Text message is get convert to Braille code in Braille Transcription.
- The Braille character will display on LCD.
- The Text message will again get convert into Voice Message using TTS(Text-To-Speech) synthesizer.

End user will get voice message as an output the process get stops.

IV. Implementation

6.1 Outputs:

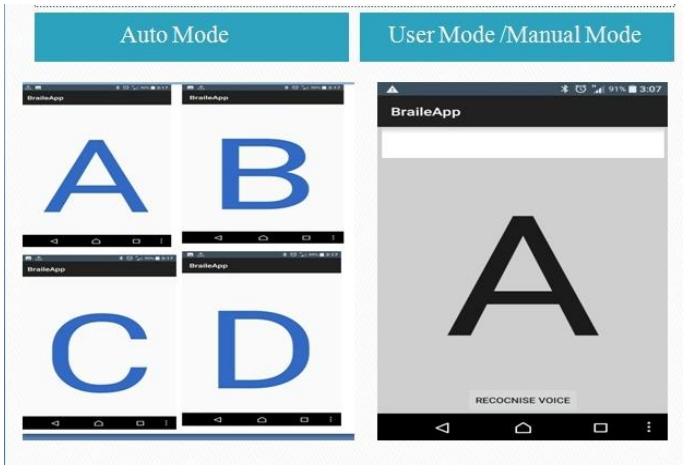
6.2 An Android Based Tutor System:



- Registration Form for the User: An Android application is created for the user to Enter the Login form to fill the details.
- Different Modes for the User to give the input:

Auto Mode and User Mode are the two different modes provided for the user to give input to the system.

1) Auto Mode and User Mode:



- Auto Mode: In which the Application will be sending each Alphanumeric Letters in a sequence to the Embedded Interpreter along with voice notifications further, the Receiver module will interpret the received Character in a Braille Pattern.
- User Mode: In which the tutor or the teacher will speak out a word say Good Luck, which will be synthesized from voice to text and each letter of the sentence spoken will be sent in sequence with some gap and the receiver Embedded system will present each letter sequence in the Braille Pattern along with the voice notification.

6.3 Voice Communicator Home Interface:

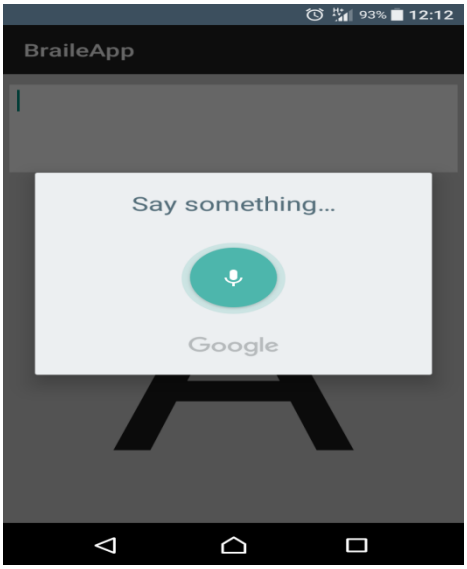


Figure 6. Voice Communicator Home Interface

In the first phase of the first setting of the user interface of the application, Voice Communicator's activation will be of synchronous text display and voice command sounding. With different commands instructed to the user, the application will then recognize which user is using the said application. The voice command is designed for the blind person. The blind will just tap once for Voice Communicator's recognition. In the user interface design communication process relies on the speaker sounding and normal messaging.

6.4 Voice Communicator Inbox Interface:

Figure 8. Screenshot of Voice Communicator's Inbox Interface

When the user gives his voice message to the android recognizer, the spelled words are get display on the Braille application interface. Here the user can check the validation for the input and user can understand whether the application is receiving the proper input or no.

6.6 Server System

Out put : This output contains both Characters and Numbers

Server System:

The System will receive the voice input from the user through the Bluetooth device. The voice message is get converts to text in the Server side system. The text in Braille Transaction using ASCIII-BRAILLY encoding will convert into Braille Characters. This Braille Character will again convert to speech at the Receiver Side.

V. Conclusion

Braille tutor helps the Visually Impaired Students to study and to attain knowledge in an easy manner and it also makes their life easier to gain the expertise over Braille script. The main advantage of this device is anyone can teach Braille, since there is no need of a teacher who knows Braille language. This enables blind to study Braille effectively since they can hear the actual pronunciation of letters and words, thereby enabling them to study by analyzing the patterns of Braille. The usability is very important to software; the results of this paper are also guideline for improving the usability and accessibility of smart phone application. This paper has analyzed two existing applications for visually challenged people and proposed a design for better application that can help blind users to carry out their routine tasks smoothly with the help of improved applications. In recent years, SMS messaging system for disability and handicapped communication aids has become widely deployed in large amount. Text to Speech is also finding new applications outside the disability market in future.

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