Speech-To-Braille Conversion Using Android

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***Abstract*— Visually impaired person cannot perform their activities like ordinary person. It becomes more difficult when a person is visually impaired along with deafness. Sometimes, it is quite impossible to communicate with such people whether in speaking or writing format. Therefore, our solution which provides braille writing format from voice. Unfortunately, people of underdeveloped countries are not getting the facilities of advanced electronic braille system for overpricing. In this work, an attempt has taken on designing a modified braille device which is economical and more compelling than previous. The device takes voice as input from an android apps and can convert the voice signal into text format of braille and project the braille letter in the device. By implementing the considered Braille system, visually impaired person can entirely engage themselves in the society.**

I. Introduction

A. General

According to recent reports, it is observed that around 2.2 billion people face visualization difficulties, there are at least 1 billion people who cannot see and they are called as visually impaired or blind.mainly our project has helping to blind and deaf people thorough this project they can lead a normal life.the communication about the people like easier to use this project and their academic and personal life will fruitful.

B. Objectives of the Work

The main objective is to create an App that would translate Real time voice, Audio and text documents into braille There would be three features To convert audio to Braille it will first module of the work saved audio files or offline audios are to be converted into braille format and the next module is convert Voice to Braille it will help real time voice converted into braille format and convert text documents to Braille format.

C. Motivation for this work

The existing systems are not portable.and always using portable devices it will handling very difficult and not much more user friendly.also Existing systems are very costly it will more connections and equipments are used properly the cost is high. Not properly implemented in Android devices in existing devices they are not implementing in android platform we are implemented throw in android platform it is easy to interacting and communicate with visually impaired person. No real time audio translation available in existing systems in our project we have implementing real time audio translation like any type of audios.

D. Braille System

Louis Braille, a French educator, invented a system of reading and writing for use by the visually impaired, called worldwide as Braille. Braille uses a structure of six dots, or eight dots composed together in a fixed matrix, called a cell. Each and every dot is either raised or flattened, giving 61 possible combinations in six-dot & 256 possible combinations in eight-dot Braille. In six-dot composition, each character is formed in a matrix having three rows and two columns. For text printed on both sides, the grid of the verso text is shifted so that its dots fall in between the recto dots. Braille represents lower number of characters per page. For a page with 25cm of width and 29 cm of length, there are 32 characters per line & 27 lines per page, with a typical dot of 1.8 mm diameter. This paper intends to present a solution, making learning process for a visually impaired person straightforward. All books cannot be obtained in Braille script, and neither can we have audio files for all books.

E. Braille Cells

A matrix with two columns and three rows of dots is arranged for each Braille cell. In any of these six positions the dots can be raised, total number of permutations is 64. Each position is numbered where dots are popped, example:

1 to 3 on Left Hand Side and 4 to 6 on Right Hand Side, from top to bottom

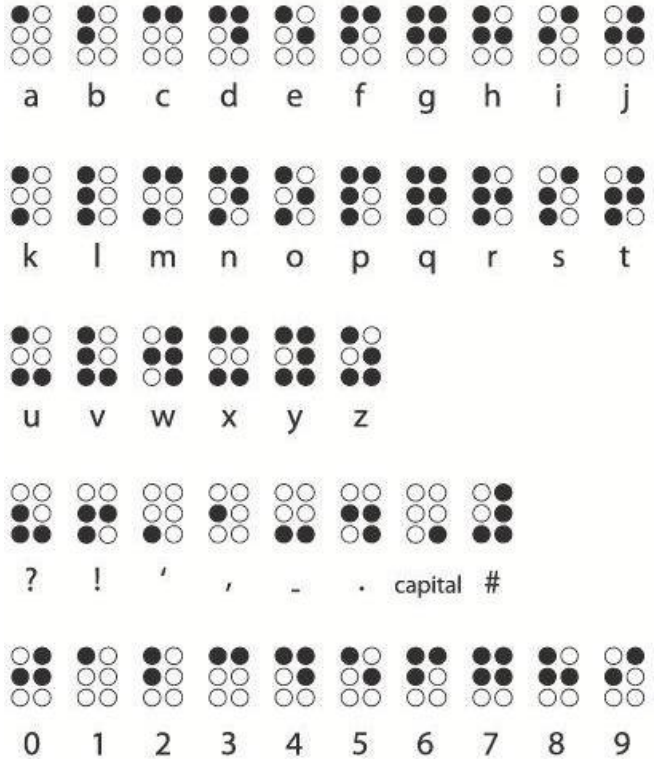

Fig. 1. Braille Alphabet and Numbers

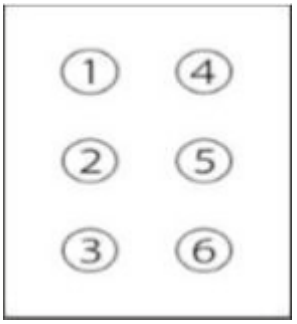

Fig. 2. Braille Cell

II. Related Works

In [1], authors develop a new system is proposed due to the shortcomings of existing systems. The text is scanned from an image using OCR and mapped to the Braille alphabet. These alphabets are then physically represented using solenoids. This system is small in size, and portable. Here we are implementing enhanced Braille system that helps blind people to read text or content. We scanned image form camera, processed that image by image processing techniques and same will be converted into text using OCR. The detected text will be given to raspberry pi which recognize every character and convert it into Braille code. With the help of solenoid, we are displaying that Braille code on Braille

In [2], Visually impaired person cannot perform their activities like ordinary person. It becomes more difficult when a per- son is visually impaired along with deafness. Sometimes, it is quite impossible to communicate with such people whether in speaking or writing format. Therefore, Expert Braille Communicating System (EBCS) is a promising solution which provides braille writing format from voice. Unfortunately, people of underdevel- oped countries are not getting the facilities of advanced electronic braille system for overpricing. In this work, an attempt has taken on designing a modified braille device which is economical and more compelling than previous. The device takes voice as input from an android apps and can convert the voice signal into text format of braille and prints the braille letter in paper. EBCS is trained with 1 epoch and the accuracy is achieved of 97.6 per. By implementing the considered Braille system, visually impaired person can entirely engage themselves in the society.

In [3], Communication plays a vital role in expressing one's feeling to another. People with vision and hearing impairment, find it difficult to communicate with one another. There are certain unique languages available for the deaf-blind people which includes tactile signing, Braille, moon etc. Among these methods, the most commonly preferred means of communication is Braille. Braille is a system developed to assist the visually and hearing-impaired person by creating arrangements of dots which form letters, numbers and punctuation marks. This paper proposes a communication device model which converts any alphanumeric English text to its corresponding Braille format that can be read by a Deaf- Blind person. An abled person can send a message to a Deaf-Blind person from his mobile phone. Once the message is received by the device, it starts converting the letters in the message to Braille format. The Braillecharacters are displayed one by one using a Braille display consisting of six vibration motors depicting the six dots in a Braille cell representation. The DeafBlind person can feel the characters by placing their palm on the Braille display unit. This paper also includes a vibration band model for the Deaf-Blind person, which acts as an indicator for an incoming message.

In [4], People with visual disabilities find many day-to-day tasks, which include basic and essential communications to be difficult. As a result, they are ought to go through a high chance of exclusion in the society. This prevents them from accessing a lot of information available in the world. They use Braille as a linguistic medium to exchange information. In today's world, many visually defective people face difficulty in learning braille. One of the main disadvantage in this method is the cost of braille products, which is too high to afford for normal people. In order to overcome these challenges, an attempt has been made to come up with a cost-efficient, and easily manageable kit which helps visually impaired people to learn braille at any age. This paper explains how solenoid-based valves are actuated using Arduino to convert English text into six-digit braille code. This six-digit code can be used to teach braille to the visually impaired people.

In [5], In this Smart Reader for Blind people, the design and development of a working model gives a smart reading help for the Blind and Visually Impaired people. The device gives self-reliant page turning mechanism and interactive

dictionary querying features, subsequently giving a experience of relief for the Blind and visually impaired people. The system not only helps Blind and visually impaired people, even a individual who wishes luxury and comfortability, or an aged man or woman can come up with the money for this. Once mounted and configured can act as a ideal nonpublic machine for the user. The machine even finds small scale purposes in Schools, Libraries etc. This will encourages the reader and brings in them an inspiration to work on the advancements or a similar undertaking that helps the society.

III. System Design

A. Methodology

1. Voice Input/ Speech : Voice Input / speech, is the process of recording voice commands or dialogues that are really spoken by a person. In this phase, the real voice commands are recorded for starting the conversion. The recorded audio is converted into a text. Now, this converted text file is sent to the next phase.
2. Audio File : Like previous process we convert audio files into text and sent to the next phase.
3. Text Document : The text document is uploaded from the device, then the data is fetched and sent to the next phase.
4. App : In the app we process the received inputs and send the processed data into Arduino using the Bluetooth.
5. Arduino : The Arduino has the code to display the Braille symbols corresponding to the received data.
6. Braille Display : The Braille display will project the Braille alphabets

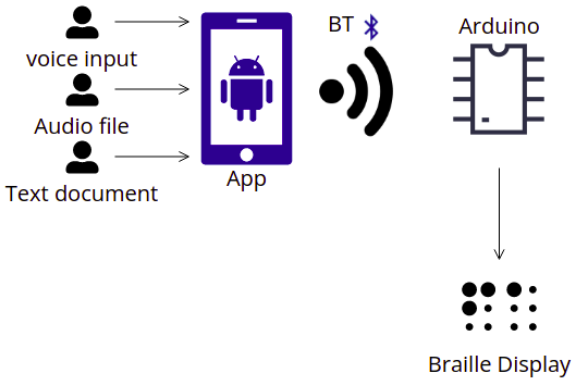

Fig. 3. Methodology.

B. System Architecture

The android app opens with the user interface which has three options for the three different input formats. The first input format is text document. It will have the option of uploading the text file onto the app. Then the app begins to fetch the data inside the file, and it will be stored in a buffer for easy access. The second input format is real time voice. The voice will be converted using the speech-to-text method. The converted text will be stored in the buffer. The third input is an audio file that will be processed like previous input and the data will be stored in the buffer. At a time we can only have a single input method mentioned above. The next phase is to read each character from the buffer with a time delay. The delay is for the smooth operation of the hardware module. The data is transferred into the arduino module using the help of a Bluetooth module. Then the arduino will receive the characters, then convert each of them into the braille script. The converted script is sent as digital signals into the servo controller. The controller will instruct the braille display to project the corresponding braille symbols. This is how the proposed system does the conversion of speech into braille symbols.

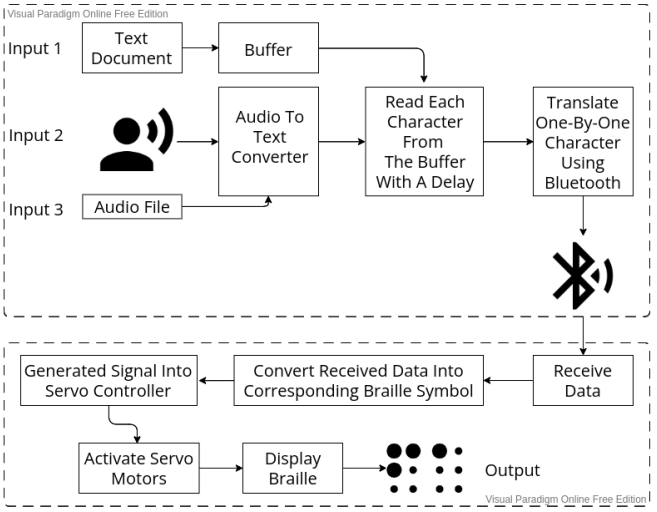

Fig. 4. System Architecture.

C. Data Flow Diagram

The Data Flow Diagram of the proposed system is the representation of data movements and transitions in each phase of the system. Here, at each phase there is a change in the form of data. Initially, the data was in the form of audio and text files, which are soundbased and text files. This undergoes converting into the standard text phase and gets the converted text data. The data has to be stored in a buffer for easy access. From there, it will convert into Braille script then display the corresponding Braille. This is the flow of data in the proposed system.

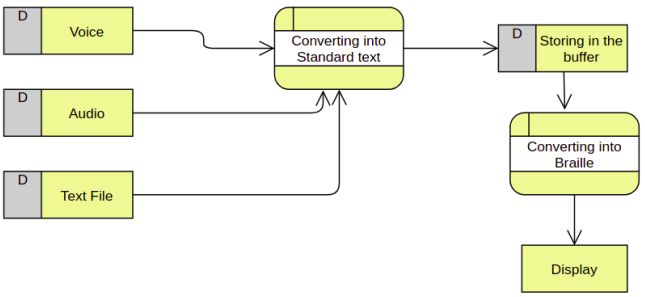

Fig. 5. Data Flow Diagram.

D. Use Case Diagram

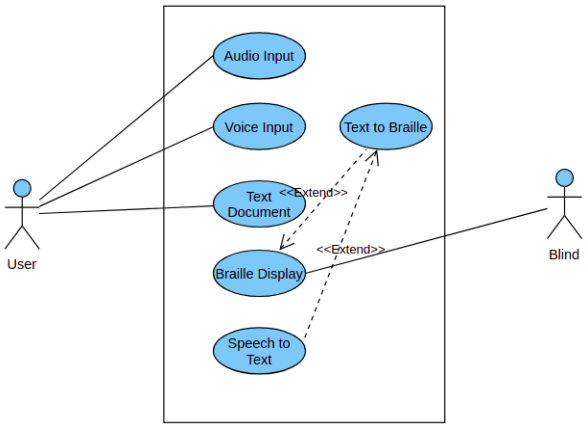

Fig. 6. Use Case Diagram.

Use case name	Braille Generation
Participating Actors	User, Blind
Flow of Events	Audio Input(U), Voice Input(U), Text Document(U), Braille Display(B), Speech to Text(S), Text to Braille(S)
Entry Condition	Audio Input, Voice Input, Text Document
Exit Condition	Displaying the Braille.
Quality Requirements	Good Audio quality.

Table. 1. Use Case scenario for the system.

IV. Expected Result

We expect that our app helps to convert translate Real time voice in to Braille format .And also convert audio files in to Braille format in to accurately . Third phase of our project convert text documents to Braille .Our project is supposed to help the blind and deaf to deal with their academics . The interface of this app will easily understandable and user friendly for blind and deaf people.

V. Conclusion

In this work, we are planning to develop a real time speech to Braille conversion android application. This android application can effectively convert any speeches recorded real time to their corresponding Braille symbols. This project is supposed to help the blind and deaf to deal with their academics. This application is intended to fill the gap of conversation between a normal person and a blind along with hearing impaired person, thus making a bond between them. Most importantly we expect to make life of a blind person better by our android application.

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