BRAILLE 8 KEYPAD WITH TRAINING & TESTING

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Abstract *: In our day to day life the telecommunication field plays a vital role especially in long distance communication. Irrespective of the major advancement in this field the physically impaired people face lot of difficulties in accessing the data as compared to normal people. Traditional Braille is a 6-dot code that can represent maximum 64 unique symbols with each braille cell. But this system is insufficient to represent ordinary English text comprising of 26 small letters, 26 capital letters, 10 digits, and 14 basic punctuations and math and science symbols. Thus, a braille user has to enter 2 and sometimes 3 or 4 braille cells to enter one character or symbol. This makes braille writing very slow and tedious.Hence to overcome this we have implemented the 8-dot Braille system that can be used by the blind people to read and write braille language. It consists of uppercase and lowercase English alphabets, Numerals, Mathematical operators and some special characters. It can represent maximum 256 unique symbols. This system is an important gateway for the blind or partially sighted people that enables them to learn braille language independently.*

Keyword – Arduino Uno – AT mega 328p, Coin Type Vibration Motors, Bluetooth Module, Arduino IDE, Android Studio,

I. INTRODUCTION : In our day to day life the telecommunication technology plays an important role. It has completely revolutionized the way we communicate, especially long distance communication. Despite of all these advancement in the telecommunication field, the physically impaired people have no access for these technologies. So as a step to bridge the gap between the blind persons and the technological advancement in the telecommunication field, a system is designed by interfacing Braille pad with the cell phone so that visually impaired person can have the access. This system will enable the blind person learn braille language.Braille is a tactile writing language of raised dots, mainly used by the blind and visually impaired. It is developed for our haptic perception, i.e., a combination of the sense of touch, movement and finger pressure. In eight dots Braille, each cell consists of a 4x2 matrix of dots. A fingertip can feel the whole cell at once. In our system the blind person can learn how to read and write braille. An Android application is used to receive voice input from the user which is transmitted to the microcontroller via Bluetooth module. The microcontroller converts the data from ASCII code to braille code which are English alphabets on Braille pad.Thus, the Braille 8 Keypad is a portable, simple and versatile device for visually impaired person that eases the difficulties of blind people in reading and writing.

II. LITERATURE REVIEW : Braille is a reading and writing system used by visually impaired people. It is based on sequence of braille cells, each comprising of embossed dot pattern. Traditional Braille code is based on a 6-dot (3 rows x 2 columns) pattern called ‘cell’. But, it can represent maximum 64 unique symbols (including ‘space’ symbol) with each braille cells, which is insufficient. [6] So, multiple braille systems had been developed for different reading/writing needs. The Classic Braille [8] had focused on optimizing braille for writing language texts. Thus, for English, it provided one-cell pattern to 26 small letters and 14 basic punctuations only. There were 10 indicators or modes, each acting either as the prefix to a multi-cell representation of other symbols or (number-indicator, caps-indicator, etc.) to indicate alternate representations of the cell pattern.The mapping assignments in the classic braille were primarily made with ‘tactile readers’ in mind, it gained instant acceptance by visually challenged. Apart from that, in order to facilitate writing of language texts, there were 48 contractions defining to letters, punctuations, as well as indicators (based on the context). Unfortunately, this made braille reading/writing extremely context-

dependent and thus, ambiguous.[7]There are primarily two unified braille codes that are mostly used world-wide Unified English Braille (UEB) [3] and Nemeth Uniform Braille System (NUBS) [4] both are aimed at unique representation for all letters and formats present in English language into braille (using indicators and contexts). Unified English Braille (UEB) derives itself from Classic Braille and is more suited to represent language text representing 26 small letters and 14 punctuations (total 40 characters) with one-cell, while Nemeth Uniform Braille System (NUBS) focuses more on representing mathematical and technical text representing 4 math symbols with one-cell. But, there are lots of mismatch between the Unified English Braille (UEB) mapping and Nemeth Uniform Braille System (NUBS) mapping.[5]

III. IMPLEMENTATION : In today's world education is one of the most prime requirement for every person. But there are some people who face difficulties in taking education specially the blind peoples, because of physical disability of eye. So in order to overcome with this problems we have designed an automatic system through which the blind people can learn and also test himself without help of any teacher. It is not necessary that the person having knowledge of braille language can only teach the blind people7. [7]

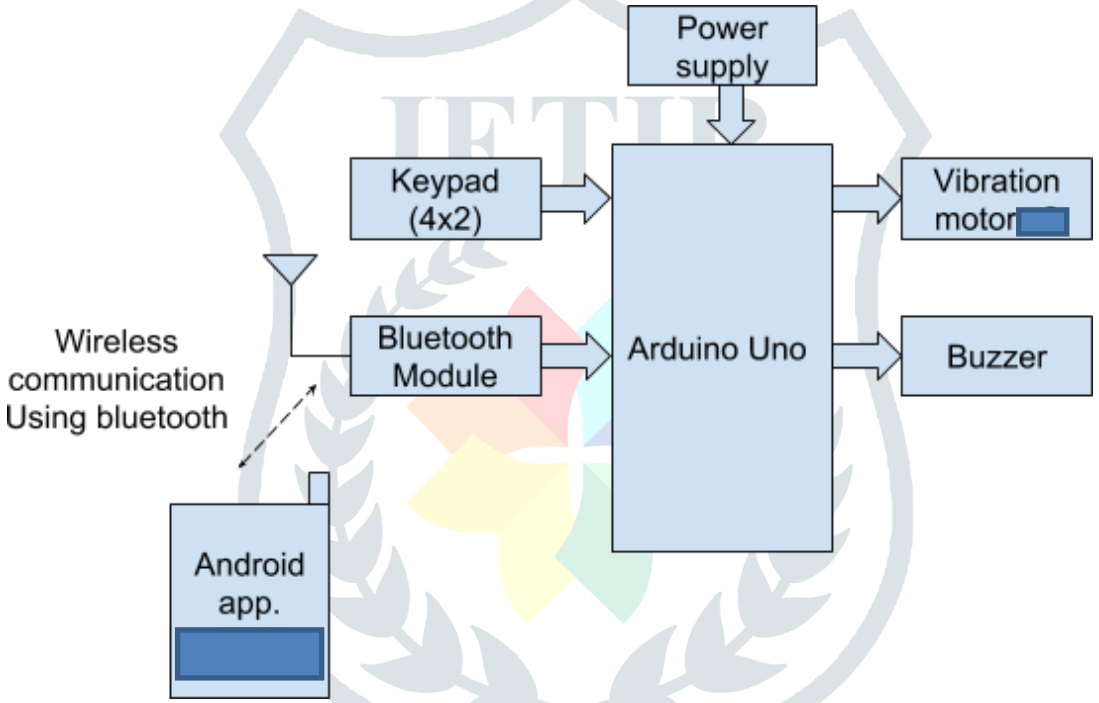


FIGURE 3.0 BLOCK DIAGRAM

In our project we have implemented automated braille 8 system. The block diagram consists of Android application, microcontroller, Keypad, and motors for generating vibrations. The text/speech input is received by android application. Bluetooth module is used for wireless communication between Android application and microcontroller. We have implemented an application program using embedded C and loading the program is fed into microcontroller through ISP(In-system programming).

There are two modes in our project i.e. (1) learning and (2) testing mode.

(1) In learning mode the speech input is given to Android application is send to the microcontroller by using bluetooth module. After receiving the data microcontroller will send signal to the motors and motor vibration will turn ON.

(2) In testing mode the user will give input (character or number) on keypad and this data is given to the microcontroller and the microcontroller will send this data on android application. The data is compared with the default library. If the data is matched with data present in the library, it will give an acknowledgement in the voice form on Android application. If there is mismatch of data then the indication will be given by the buzzer and the buzzer beeps.

IV.Design (Circuit Diagram):

In our project we have implemented Braille-8 dot system. Arduino UNO is used to run the code that makes the device sends and receives the Braille data. Android application is used to receive voice from visually impaired users. Bluetooth module is used to transmit and receive data between Android app and microcontroller. Microcontroller will process the data and send the signal to vibration motors

Our system operates in two modes :

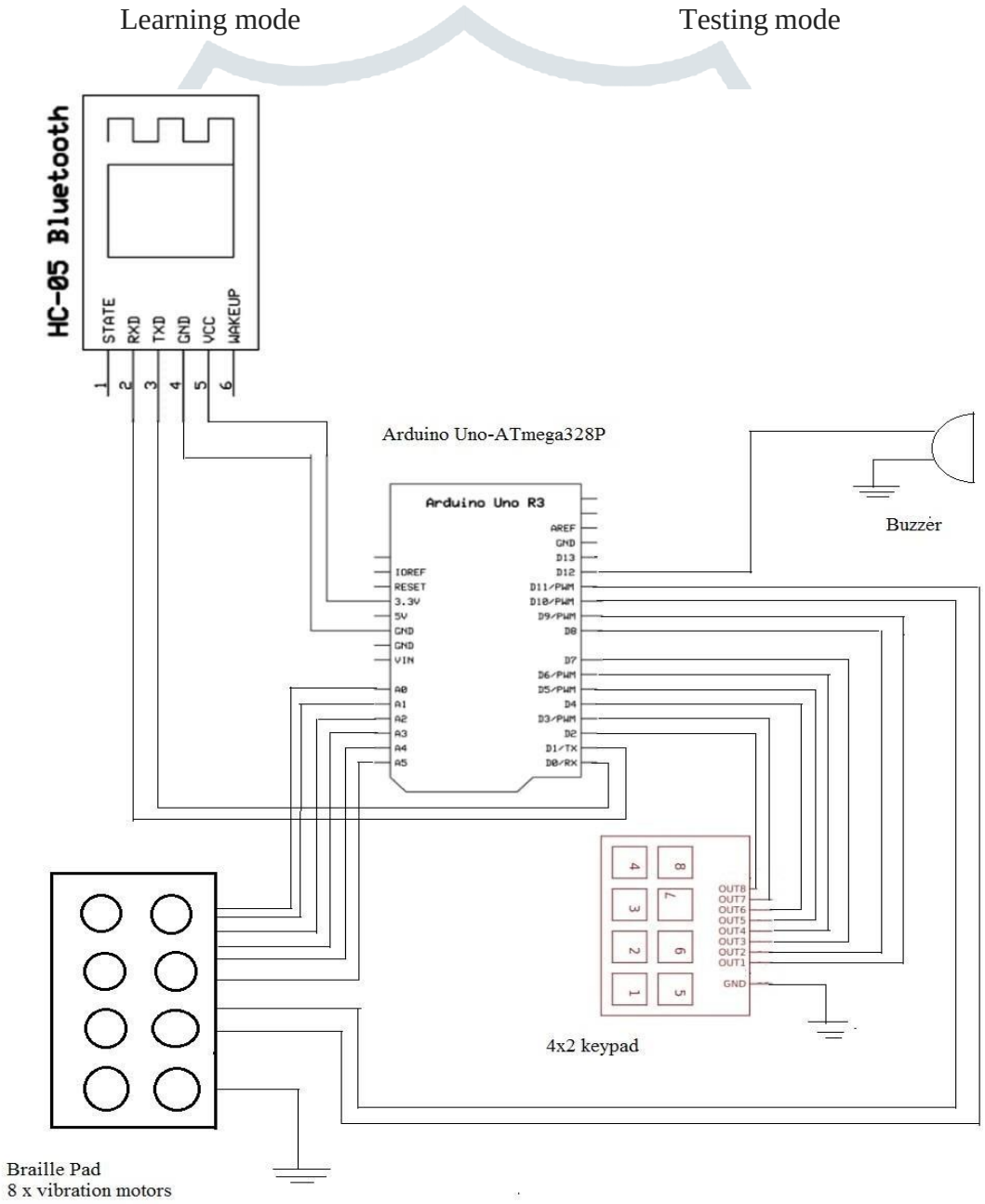


Figure 3.3.0 Design (Circuit Diagram)

LEARNING MODE:

- Android app is used for taking input and giving output in speech format through Text To Speech(TTS) .
- The microcontroller via Bluetooth module will receive the character or number sent from the user.
- After receiving the character or number, the microcontroller will decode the character in ASCII value and according to that it will excite the vibration motors.
- It is able to recognize A to Z Alphabets in uppercase and lowercase.
- It can identify common words like and , but , can , etc.
- It can recognize greek letters like α, β, γ, δ, ε, etc.
- It can identify mathematical symbols + , _ , × , ÷ , etc.
- It will provide audio of character or number for acknowledgement.

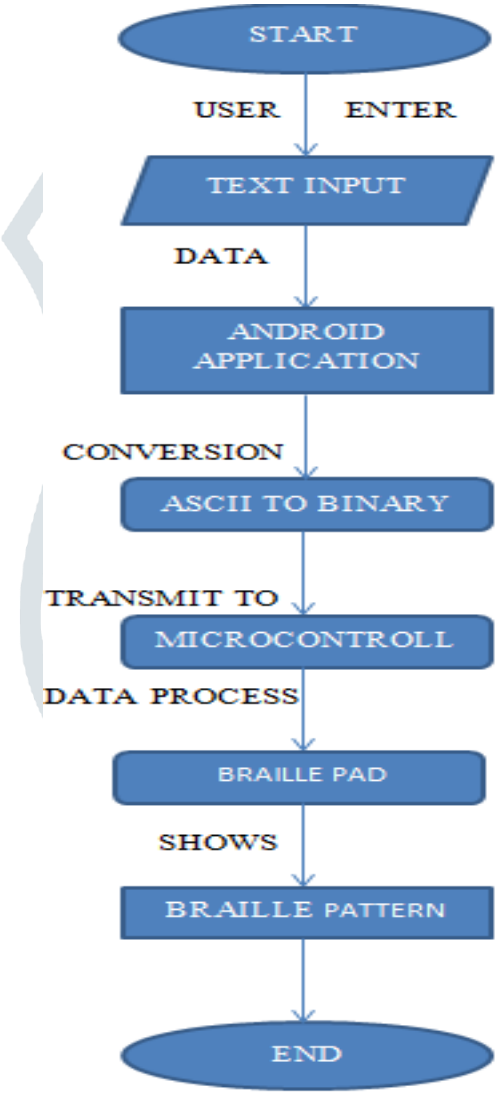


Figure 3.3.1 Flow Chart of Learning Mode

TESTING MODE:

- In this mode, a Blind person will send character or number using keypad connected via microcontroller.
- Microcontroller will decode the data and send this data to application present in Android phone.
- The data is compared with the default library. If the data is matched with data present in the library, it will give an acknowledgement in the voice form on Android application. If there is mismatch of data then the

indication will be given by the buzzer and the buzzer beeps.

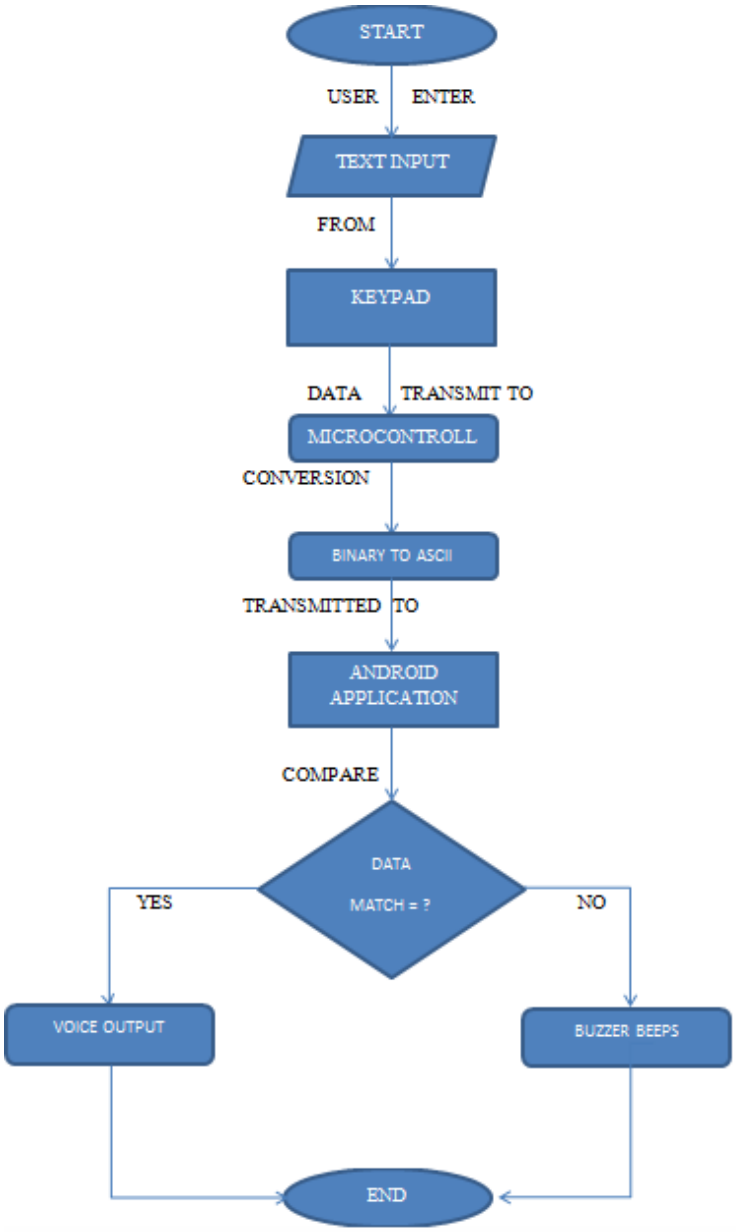


Figure 3.3.2 Flow Chart of Testing Mode

V. RESULT :

In our system, Braille8 keypad can be used by blind people to read and write braille language.

It consists of uppercase and lowercase English alphabets, Numerals, Mathematical operators and some other characters.

Braille is one of the medium available to literate the people who use their tactile sense as the primary means of gathering information.

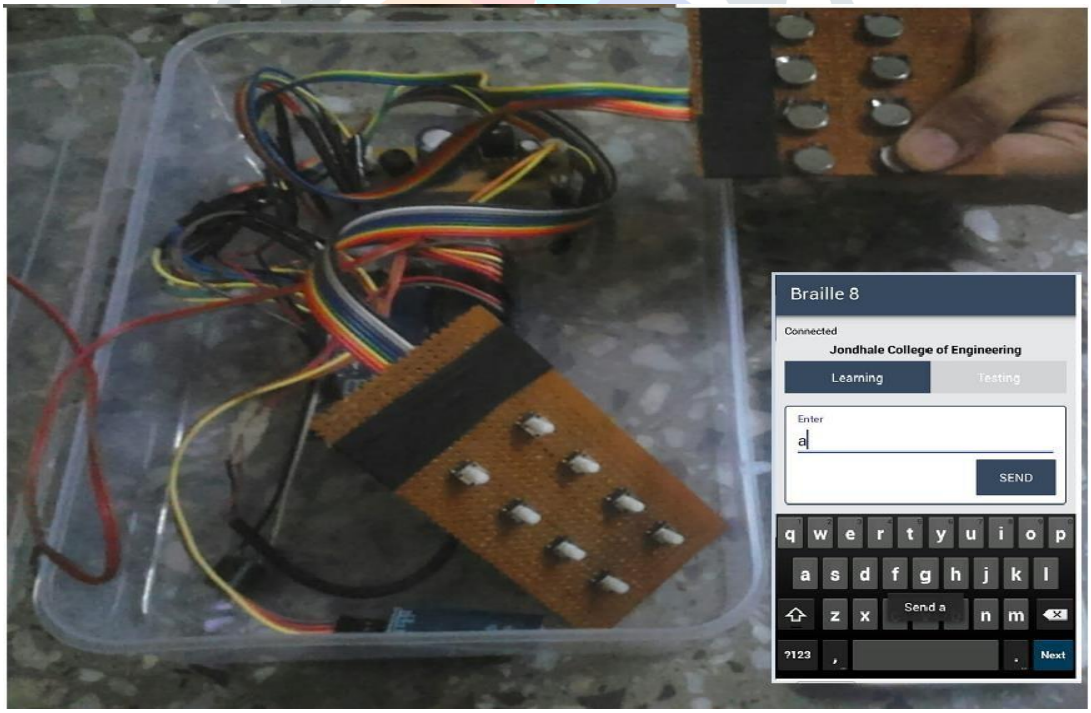
It eliminates environmental barriers for the people with a wide range of disabilities, thereby providing them with a sense of independency.

It also allows reading and writing skills to be improved.

- Our System consists of two modes :

- LEARNING MODE

- User is able to recognize A to Z Alphabets in uppercase and lowercase.
- It can identify common words like and , but , can , etc.
- It can recognize greek letters like α, β, γ, δ, ε, etc.
- It can identify mathematical symbols + , _ , × , ÷ , etc.



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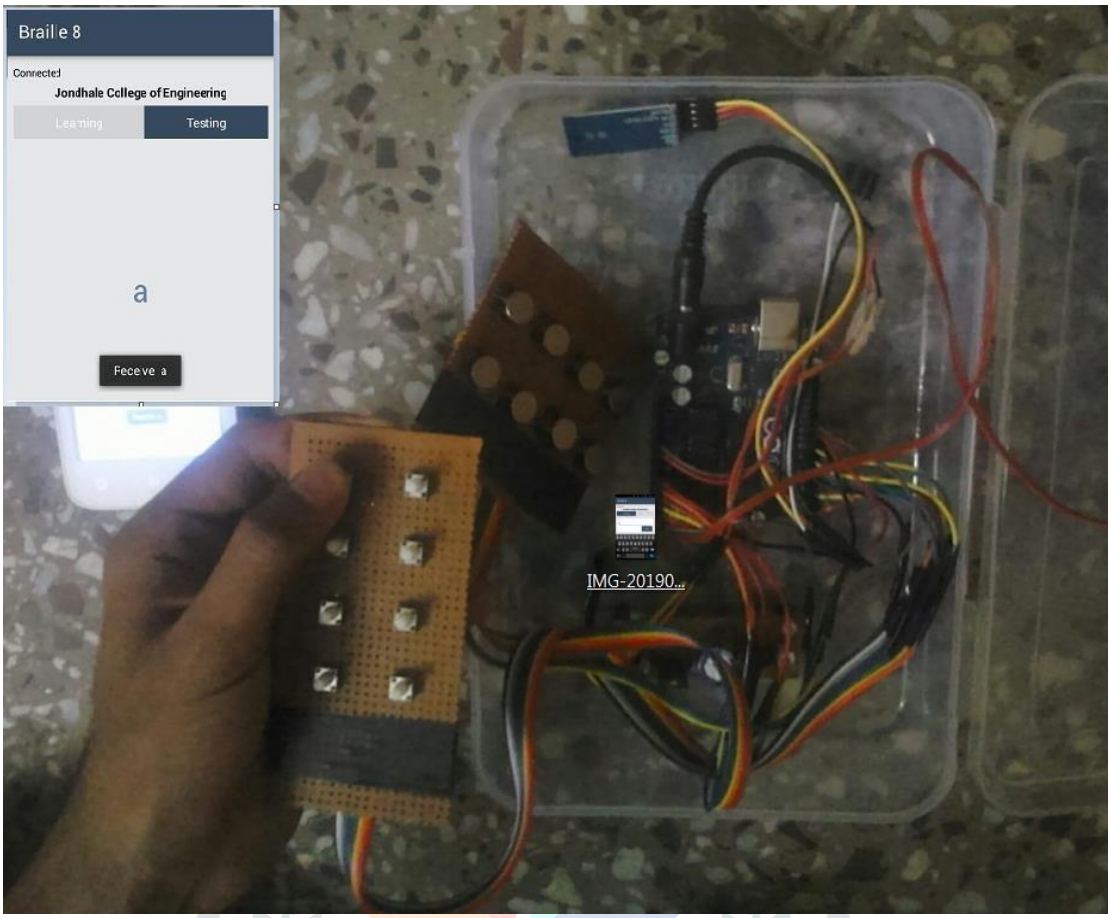

Figure 4.2 Testing Mode

VI. CONCLUSION :

The idea of our system for visually impaired people is a vital tool and its application in the area of telecommunication have significant role. It allows environmental barriers to be removed for people with a wide range of disabilities. Braille pad has the potential to be considerably less expensive while offering superior performance when interfaced with phone. This low-cost Braille Pad is an effective system for blind people to learn Braille, to read and write Braille from the mobile phone. It is a low- cost multi-tasking Braille Pad system, which is light-weight, portable, easy to use and maintain.

Braille pad, as an assistive technology for the visually impaired, offers advantages over comparable technology that is currently available. Braille-8 has defined the Unified Braille Unicode System that provisions braille users a way to write compact braille code. It has potential to be adopted as the new Braille standard for the braille user's world-over.

Thus, we conclude that our system is quite effective in teaching the braille language to the visually impaired people.

VII. FUTURE SCOPE :

In future the system can be modified to read the word in a string and will be able to read the SMS, mail, posts and books also. Thus we can conclude that with some modifications in conventional communicating device, we can include large number of physically challenged people in communication system.[4]

In future the system could consider making the design more compact and in all aspect, more easy to use. Thus with some modifications in previous conventional communicating device, we can accommodate large no. of visually impaired people in communication system. Text to Speech is also finding new applications outside the disability market in future.

Braille-8 has potential to be adopted as the new Braille standard for the braille users world-over. Braille-8 mapping is for English language only. Future work would require Braille-8 mapping for other world languages too. Braille-8 is designed such that it can be programmed from text-to-braille and from braille-to-text. Future work would also include a language processor that converts MathML and LaTeX code to Braille-8 Unicode sequence. It would provide instant access of all the knowledge to the visually challenged people.

VIII. REFERENCES :

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