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A Paradigm Shift to Braille Data Entry System for the Visually Impaired: A Review

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Abstract: In today's world number of technologies is available for the smooth functioning of society. Out of that telecommunication plays an important role. Despite the advancement in telecommunication sector visually impaired – partially impaired find difficulties while using the applications efficiently. Advancement in the field of visually impaired people's world has enabled them to use different types of applications like electronic long cane, advanced path detector, voice based contact list. However voice based contact list application needed software keys to be remembered. This paper reviews a mobile data entry system using microcontroller which will be helpful for visually impaired for the communication purpose and to overcome the drawback of previous applications. Also focusing towards a low cost and robust system implementation within affordable reach.
Keyword*s: Braille cell, Braille matrix GSM modem, lookup table, microcontroller, relay.*

I. INTRODUCTION

Society functions with the smooth exchange of goods, services and information. Most of the transactions are solely carried out through the Short Message Service facility. But these services can be effectively used by only visual people. All of us need to make calls or message through mobiles at any time from anyplace. Visual people never need assistance but this is not the case with visually impaired ones, they always need interpreter, human or machine assistance with them. It leads to a very serious problem of blind people. Traditional mobile phones never had a facility to provide any feedback for acknowledgements nor adapted to the users basic needs. Special hardware's which were made for the availability of mobile services were also cumbersome for the handling purpose and to be used in context entry. For visually impaired, voice based contact lists are provided so that they can do calling whenever required. But for that it's needed that that they have to remember the software keys. To overcome the drawback of these software keys this paper proposes a system which is going to provide solution for this. Earlier developed technologies are discussed in the next section and proposed systems model is discussed in design concept section.

II. RELATED WORK

A. Background

Braille is a tactile language system enabling visually impaired people for reading. Different countries have developed Braille code to suit their own native languages. But still there are many visually handicapped persons who use standard Roman (English) alphabets for the information exchange providing convenience for the communication. Roman alphabet or punctuation marks are represented by each Braille code derived from the Braille matrix . Total sixty three characters can be represented through each dotted pattern. One printed sheet of Braille code consists of twenty rows of maximum 40 braille cells in each row. Thus total 180 Braille characters on each page. Six dots in 3x2 matrix form allow sixty three different patterns of Braille code. Few words can be represented by a single group of dot patterns as shown in fig. 1. which are encountered frequently. This helps in minimization of space required for the printing of Braille code as well as memorizing dot patterns.

Fig.1 Braille dot pattern for the representation of Characters

Garcia et al.[1] had designed the electronic long cane (ELC). It provides the type of assistance to the impaired people for the locomotion. Instead of human assistance they had tried to provide machine assistance. It consists of Ultrasonic sensor (LV Max Sonar EZ series, MaxBotix, USA), and a 9-Vbattery. The hepatic (Ultrasonic) sensor and controller were embedded in the cane in order to detect physical barriers above the waistline according to echo principle and to provide tactile feedback in the vibration form. It helps the blind people to wonder independently everywhere. It could detect the obstacle at a short distance of 1m which was inconvenient if person wanted to lookout for distance greater than one meter. Warning of hazards at head height was very useful. However it was bulky ,further modifications are required for the reduction of long cane weight so that it can become handy for any visually impaired person right from younger age to the aged person.

Anbazhagan developed advanced path detector [2]. The photodiode device along with IR LED is attached to the white stick. It had fixed it's emission axis horizontally in the detector stick. As the visually impaired person moves the white stick to detect the obstacle, it will scan in every direction it has moved; hence protection zone enlarged. It can detect the obstacles upto 4-6m (long distance away), which is an improvement over the previous electronic long cane[1] i.e. impaired person can lookout for the long distance for locomotive purpose. But while incorporating all these advancements it leads to the costlier proposal.

Brailler et al.[3] has developed Braille Writing Devices -- Perkins Brailler. It is by far the most efficient device for producing braille "by hand" (i.e., not generated by computer).It is a machine for embossing characters on paper. It is capable of embossing 25 lines of 40 characters each, which is the page layout implied by the National Language Support(NLS) standards. It should be noted that even though 11x11.5 inch paper is standard, many rely on 8.5x11 inch paper. It facilitates the embossing of the characters fast, making clean dots, and being easy to use, easy to read braille. Braille embossers are known for their bulk and high price. They print slowly, are loud, and have different limitations as a compromise for their small size. American Foundation for Blind (AFB)[4] has developed refreshable Braille display. A refreshable Braille display is an electromechanical device for displaying Braille characters, usually by means of raising dots through holes in a flat surface. Blind computer users, who cannot use a normal computer monitor, Typically, braille displays are available with 40, 70 or 80 characters and is refreshable that is , it shows continues changes as the user moves the cursor around the screen. This movement can be done using command keys or using cursor routing keys or windows and screen reader commands. Direct access to information allows the user to check format, spacing, and spelling. But leading to costlier proposition. Piezoelectric cell[5] piezoelectric benders, sold in the U.S. are used in all mass-produced refreshable Braille displays with more than a few characters. Lead zirconate and lead titanate ceramics seem to be the most popular for Braille cells. To take the advantage of Piezoelectric is not easy task .It requires advanced manufacturing and tight tolerance to provide us required responces , repeatability and precision, that why it became expensive for the production at low quantity. It leads to the expensive product but provides good performance. The reason for the size limitation bend very little per unit length, so they have to be much more than an inch long. Solenoid [6] electromagnetic actuator technology has been mostly used for producing Braille. Tight packing is needed for displays of useful size, even with coil assemblies and components fabricated with truly miniature solenoids. Low cost ,low power requirement. But the technology was less successful because of a combination of reliability and repair problems.

III. PROPOSED DESIGN

Braille text message transmitter is as shown in fig.2. In this visually impaired would be able to send message using Braille matrix which is connected to the microcontroller. Further processing includes the transmission of message through the transmitting antenna.
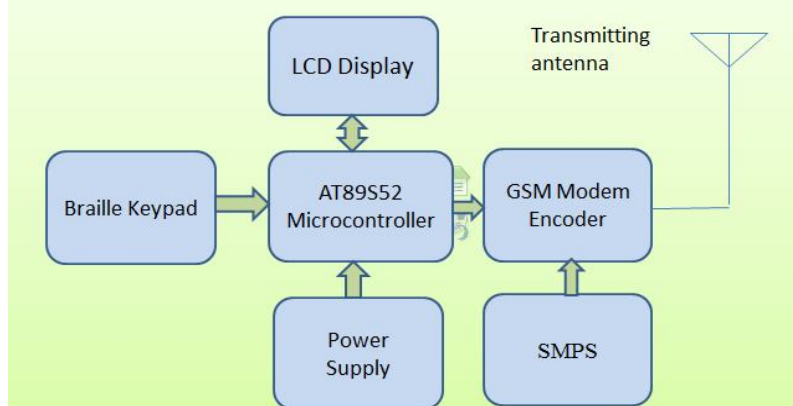

Fig.2 Braille Text Message Transmitter

Braille text message receiver is as shown in fig. 3. At the receiver side message will be recovered through the GSM modem and the reverse process is followed except the output mode which consists of solenoids arranged in dot matrix form.
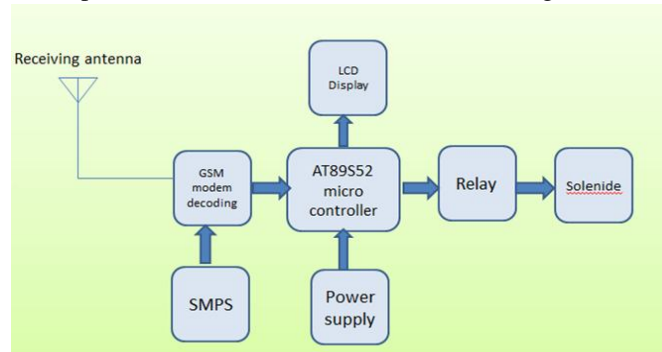

Fig.3 Braille Text Message Receiver

IV. CONCLUSION

Advancement in telecommunication and welfare of visually impaired people over the last few decades has encouraged researchers to develop the idea of advanced messaging system for them. Survey of some of the systems has been summarized. Through this system mobilized control over the field can be gained, also cumbersome handling as well as transmission of text and reception of text can be reduced to a some extend. It will allow the barriers of visually impaired people to be get removed and finds great environment for healthy communication among all human beings.

REFERENCES

[1] V. Ramya, Laxmi Raja, B Palaniappan," Voice Assisted Embedded Navigation System for the Visually Impaired" International Journal of Computer Applications (0975 – 8887), Volume 64– No.13, February 2013,Page No.42-48.

[2] B. Anbazhagan, V.Nandagopal," Enhanced Independence Free Path Detector To Blind People Using GSM", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 2, Issue 4, April 2013, Page No.13-12.

[3] Padmavathi S., Nivedita V.,Sankari G., Raamprashanth N.S., Rajat Bohra, "Economic Printing Of Braille Documents", International Journal of Emerging Technologies in Computational and Applied Sciences(IJETCA -S), ISSN(Print): 2279-0047, ISSN(Online): 2279-0055, Page No.170-173.

[4] Jun Su Lee and Stepan Lucyszyn, Senior Member, IEEE," A Micro machined Refreshable Braille Cell", Journal of Micro Electromechani- cal Systems, Vol. 14, No. 4, August 2005, Page No. 673-682.

[5] Ramiro Velazquez´, Hermes Hernandez, Enrique Preza," A portable piezoelectric tactile terminal for Braille readers", Applied Bionics and Biomechanics 9 (2012) DOI 10.3233/ - 2012-0055, Page No. 45–60.

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