SMS Communication System for Blind People

[1]Maggavi Himani Mahadev, [2]Katare Usha Dhondiram, [3]Mahale S. Prabhakar, [4]Prof. Dr. S. R. Patil
[1,2,3]UG Student, [4]Professor, HOD, [1,2,3,4]B.E.(E&TC), Pune, Maharashtra, India.
[1]himani.m.maggavi@gmail.com, [2]ushakatare1995@gmail.com, [3]shrutika.m.14@gmail.com, [4]srpatil44@gmail.comik

Abstract: In our day to day life the telecommunication technology plays an important role. Because of the lack of vision, the blind people are not able to access the information and the technologies through other communication facilities. Latest technological enhancements are very expensive so the blind people cannot easily afford these technologies. Also these technologies are not easily portable. Therefore it is necessary to develop a low cost Braille System for the blind people. Here we introduce a communication channel for the blind people for the communication purpose. Here the user sends the SMS (Short Message Service) to the blind person's mobile number which is connected to the microcontroller which reads the SMS using GSM (Global System for Mobile Communication) module through the AT commands. The blind person then hears this message through a voice announcement which is done by the loud speaker. For receiving an SMS sent by the blind person, the microcontroller converts the typed Braille letters on Braille pad to the English alphabets using the lookup table. This is then sent to that mobile phone whose number is selected by the blind person.

Keywords — Braille Keypad, SMS(Short Message Service), GSM(Global System for Mobile Communication), AT command, bridges the gaps.

I. INTRODUCTION

The telecommunication technology has become the integrated part of our day to day life. It has completely revolutionaries the way we communicate, especially long distance communication. Then there came the age of mobile communication which facilitates a great deal to communicate on a go. Mobile cell phones are the milestone in telecommunication technology. Despite of all these advancements in the telecommunication field, the blind people have limited access for these technologies. So as a step to bridge the gap between the blind people and the technological advancement in the telecommunication field we decided to design a SMS system for them.

We are designing a modular device which is accessible by blind people. Braille language is used as the basis of the project. Blind people use the Braille language for reading and writing purpose. Till date they conventionally use Braille books. But it is not an economical way of communicating now a days. It has limitation on the maximum number of words per page and pages per book. Therefore interfacing Braille pad with the GSM module so that blind people can have the access to the SMS system is advantageous. Voice announcement system is interfaced as an extra feature.

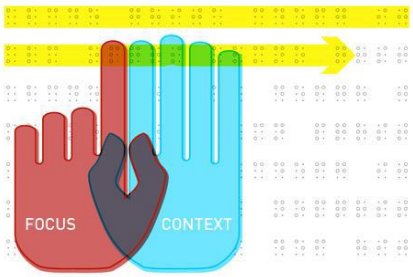

Figure 1: Traditional method for reading used by blind people

Braille is named after its creator, Frenchman Louis Braille, who lost his eyesight due to a childhood accident. In 1824, at the age of 15, Braille developed his code for the French alphabet as an improvement on night writing. He published his system, which subsequently included musical notation, in 1829. The second revision, published in 1837, was the first digital (binary) form of writing.

Braille characters are small rectangular blocks called cells that contain tiny palpable bumps called raised dots. The number and arrangement of these dots distinguish one character from another. Since the various Braille alphabets originated as transcription codes of printed writing systems, the mappings (sets of character designations) vary from language to language. Furthermore, in English Braille there

are three levels of encoding: Grade 1, a letter-by letter transcription used for basic literacy; Grade 2, an addition of abbreviations and contractions; and Grade 3, various non-standardized personal shorthand's.

Braille is a tactile writing system used by the blind people. 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. Then many parents have difficulty educating their blind or visually impaired children. Teachers engaged in special education have to depend on Braille translator when marking Braille papers or assignments, so subjective factors are brought into the evaluation process. In this project, this difficulty has been overcome by converting the Braille language directly to the English language, thereby reducing the complications.

In this project, the GSM module is interfaced to microcontroller through MAX232 level shifter. A relay is also used to indicate SMS reception and delivery. Also the user sends the SMS to the blind person's mobile number, connected to the microcontroller which reads the SMS using GSM module through the AT commands. The blind person hears this message through a voice announcement done by the loud speaker. For receiving an SMS sent by the blind person, the microcontroller converts the typed Braille letters on Braille pad to the English alphabets using the lookup table. This is then sent to that mobile phone whose number is selected by the blind person.

The system is easy to operate, low-cost, greatly enhanced the ability of blind people access to information. Braille cells are not the only thing to appear in embossed text. However, Braille education remains important for developing reading skills among blind children, and Braille literacy correlates with higher employment rates.

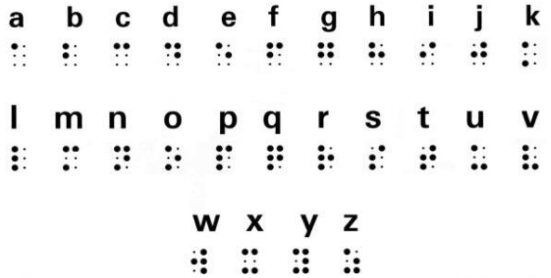

Figure 2: Braille Script

II. LITERATURE SURVEY

1. Braille is a tactile writing system used by the blind. It is traditionally written with embossed paper. Braille-users can read the 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. In our project, we use a Braille keypad so that the blind people can type the message on it which will be converted to textual format and sent to the selected mobile number[1].

2. A very well known example of a tactile display is a refreshable Braille display which converts text information from a computer to Braille representation for the blind people to read. Text information coded in Braille language is displayed on this Braille display using six vibration motors which are settled on the body. Blind people thus understand the output by sensing the vibration that the device makes. In our project we replace this display by interfacing a loud speaker which makes a voice announcement of the message sent to the blind person[2].

3. According to latest survey in India, 84% of people use smart phone technology for communication. Therefore it is a good and useful technology which is used to communicate with others worldwide. It is now possible to connect with outside word by making calls or by sending messages from mobile phones. SMS is the very useful application available in mobile phones. This application is used by almost 90% of users. But the blind people are not able to use this technology. Using this project it is possible for the blind people to communicate using this kind of message communication. [3]

4. From the literature survey we have seen various ways in which this project can be implemented. We may either use the Braille keypad with vibrators or we can design gloves on which the vibrators are attached or directly connect the vibrators to the body parts. Also we can use voice announcement by a loud speaker for the blind to retrieve the message. From all these techniques we found the method of using loud speaker more understandable, convenient and economical. Thus we will be doing our project based on this technique.

III. SYSTEM ARCHITECTURE

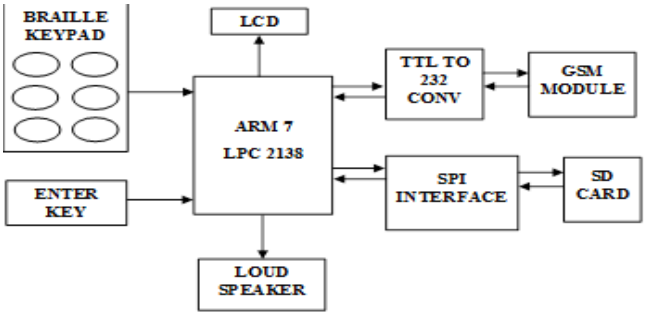

Figure 3: Block diagram of the system

This system consists of :

- ARM7 LPC2138
- 5V Power Supply Circuit
- 16x2 LCD Display
- GSM SIM 900 module
- MAX232 Level Converter
- SD card
- Braille Keypad

IV. SYSTEM OVERVIEW

The basic system consists of a PCB with contains an ARM7 microcontroller, LCD module, SD card, MAX232 IC, power supply circuitry and audio amplifier circuitry. GSM module is one key module which is used in the system.

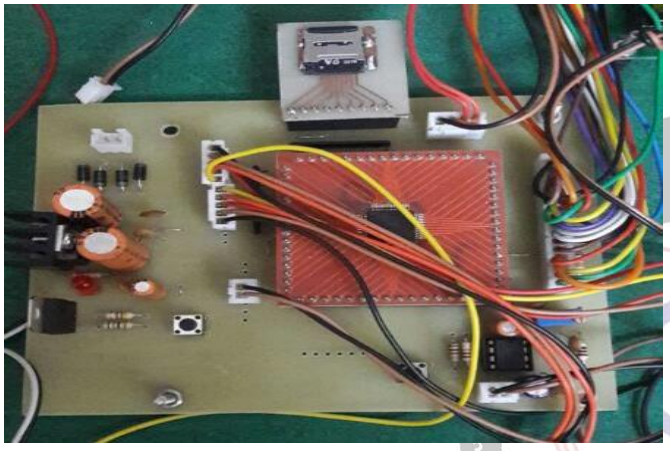

Figure 4: Main PCB of the system

The overview of the system is shown. After supplying power to the system it comes into ready mode for sending and receiving SMSs.

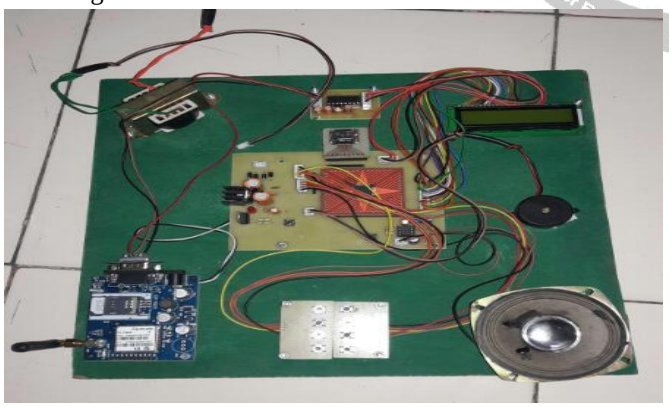

Figure 5: Overview of system

The brief description of these is given below:

ARM7:

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high-performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously.

LIQUID CRYSTAL DISPLAY:

The LCD display is used to display the messages to the users. LCD is used in the project to visualize the output of the application. We have used 16x2 LCD which indicates 16 columns and 2 rows. So we can write 16 characters in each line. So, total 32 characters we can display on 16x2 LCD. LCD can also used in the project to check the output of different modules interfaced with the microcontroller. Thus LCD plays a vital role in a project to see the output and to debug the system module wisely in case of system failure in order to rectify the problem.

RS232:

RS 232 is a serial communication cable used in the system. Here, the RS 232 provides the serial communication between the microcontroller and the outside world such as display, PC or Mobile etc. So it is a media used to communicate between microcontroller and the PC.

In our project the RS232 serves the function to transfer the edited notice (or data) from PC (VB software) to the microcontroller, for the further operation of the system.

SD CARD:

SD card is basically is used as a storage device which will required to store the required data. The system database can be used to store in SD card in the form of .wav file and can be accessed from that whenever it is required. SD card is interfaced with the system using a protocol called SPI protocol.

POWER SUPPLY:

Power Supply is an important part of a circuit. Power supply is an electrical power source to the whole system. It provides required supply to different blocks of the circuit from input 230VAC. The main blocks include transformer, rectifier circuit, filter circuit, and regulator circuit. Voltage regulator IC LM7805 is used as a voltage regulator. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Here in our project we need a 5V DC power supply for all electronics involved in the project and 5-12V DC power supply for the GSM module.

BRAILLE KEYPAD:

The Braille keypad is made of six push buttons where the blind user types his message letter by letter. There are two extra push buttons which are used as space and enter respectively.

The Braille keypad interfaced with the system is shown below.

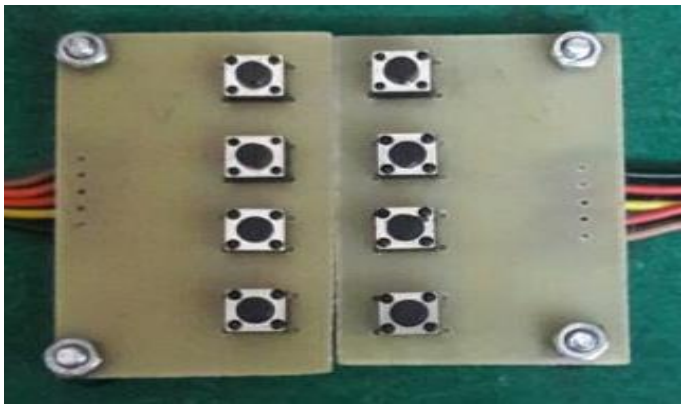

Figure 6: Braille Keypad

GSM MODEM:

GSM (Global System for Mobile communication) is a digital mobile telephony system. With the help of GSM module interfaced, we can send short text messages to the required authorities as per the application. GSM module is provided by SIM uses the mobile service provider and send SMS to the respective authorities as per programmed. This technology enable the system a wireless system with no specified range limits. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900MHz or 1800MHz frequency band.

V. EXPERIMENTAL RESULTS

After supplying power to the system the system comes into Ready mode. After that one may perform two functions, either transmission of SMS or reception of SMS.

A. SMS SEND:

The blind person can type the SMS using the Braille keypad. The microprocessor then converts the Braille letter to the English alphabets using the Lookup table. After the message is translated into alphanumeric English letters the microprocessor sends the typed SMS via the dedicated mobile using AT commands.

B. SMS READ:

The user sends the SMS to the blind person's mobile number. The microprocessor reads the SMS connected to it via the data cable through the AT commands and then converts the SMS to audio format and announces it through the loudspeaker.

Once the circuit is given a power supply, it gets initialized and ready for operation. The circuit in ready mode is shown below.

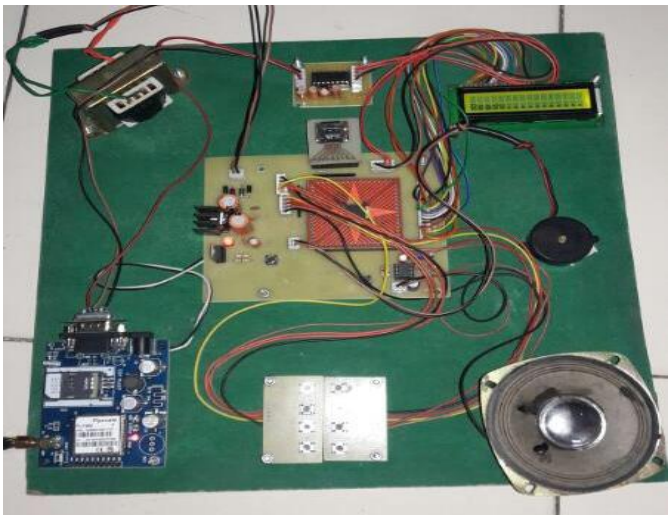

Figure 7: System in Ready mode

Process when the blind user sends a message: Firstly the blind user's SIM card is inserted in the GSM module. Then the user needs to type the message through the Braille keypad. This message is displayed on the LCD for verifying purpose as shown below.

Now the user needs to press the Enter key to send the message. Accordingly he has to press another key depending on which contact number he/she wants to send the message to.

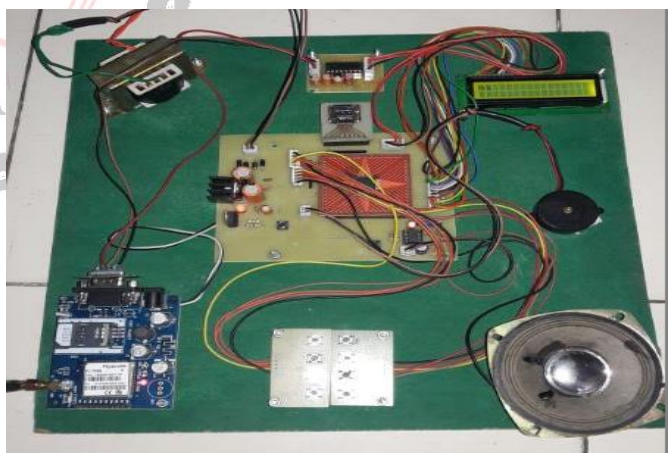

Figure 8: System ready to transmit SMS "hi"

Process when the blind user receives a message: Let us consider that the blind person has received a message "hello". Then this received message, like other phones will be displayed on the LCD module, but along with it, it will also be announced through the loudspeaker. Circuit with "hello" displayed on LCD is shown below.

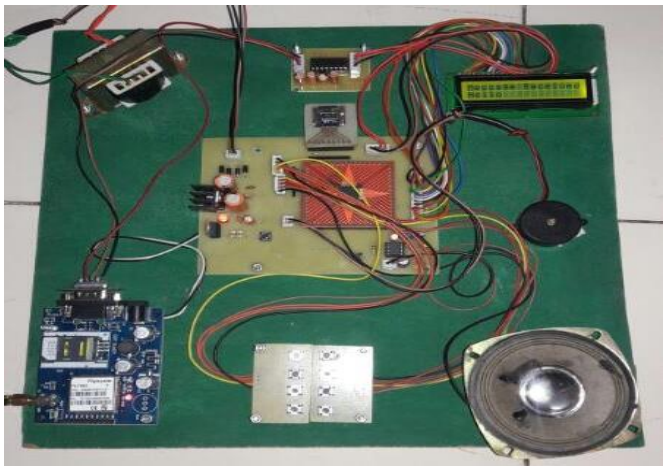

Figure 9: System with received SMS "Hello"

Here the text message that arrives on the SIM card is first sent to the ARM7 microcontroller. Then the process of comparison of audio files stored in the SD card and the text words is done. As soon as the audio file matching the text file is found, that audio file is announced through the loudspeaker.

Thus the entire message received by the blind user is announced by the loudspeaker.

VI. IMPLEMENTATION

The specification of hardware and software implementation is given below-

A. **Software specification**

1. Keil 3 Software
2. Proteus_vsm_7.4_professional Software
3. Flash magic Software
4. Sound Fourge

B. **Hardware specification:**

1. Glass epoxy PCB of size 9cm x12cm
2. GSM SIM900 Module
3. Buzzer
4. Speaker
5. SIM card

Future improvements that can be done include compressing the circuitry to give it way to the actual market, using direct text to speech convertor instead of storing a particular library of words in the SD card.

VII. CONCLUSION

This paper presents a SMS Communication system that is very useful for the blind society. An innovative SMS communication system is developed using various modules like GSM module, Braille keypad, loudspeaker, SD card and buzzer. The toolkit will accept the SMS from the normal user, store it, converts it to voice signals and then announces it through the loud speaker and also displays it on the LCD module. This system also gives an alarm using the buzzer to indicate that a message has arrived. Thus the telecommunication technology can also be used by the blind people.

REFERENCES

[1] G.DeviPriya, N.Indumathi, N.Kalaimagal, A.Suriya, J.T.Vasuki ,"*Hardware Based Braille Pad on Mobile Phone*" International Journal of Innovative Research in Computer and Communication Engineering, Vol. 3, Special Issue 2, March 2015, ISSN(Online): 2320-9801,ISSN (Print): 2320-9798,Dept. of Electronics and Communication, Narasu'sSarathy Institute of Technology, Salem, India.

[2] RumanSarkar, Smita Das, DwijenRudrapal ,"*A low cost Micro electromechanical Braille for blind people to communicate with blind or deaf blind people through SMS subsystem*" 2013 3rd IEEE International Advance Computing Conference (IACC), 978-1-4673-4529-3/12/$31.00_c 2012 IEEE, Computer Sc. & Engineering Department NIT Agartala, Tripura, India.

[3] Ms.Varsha Gaikwad, Prof. R. M. Khaire ,"*Hardware Based Braille Note Taker*" International Journal of Science, Engineering and Technology Research (IJSETR), Volume 4, Issue 11, November 2015, ISSN: 2278 – 7798.

[4] Zakaria Al-Qudah, Iyad Abu Doush, Faisal Alkhateeb, Esalm Al Maghayreh, Osama Al-Khaleel ,"*Reading Braille on Mobile Phones: A Fast Method with Low Battery Power Consumption*" 2011 International Conference on User Science and Engineering (i-USEr), 978-1-4577-1655-3/11/$26.00 © 2011 IEEE, Computer Engineering Department Jordan University of Science and Technology, Irbid, Jordan.

[5]Jussi Rantala, Roope Raisamo, Jani Lylykangas, Veikko Surakka, Jukka Raisamo, Katri Salminen,Toni Pakkanen, and Arto Hippula ,"*Methods for Presenting Braille Characters on a Mobile Device with a Touchscreen and Tactile Feedback*" IEEE Transactions on Haptics, Vol. 2, No. 1, January-March 2009, 1939-1412/09/$25.00 _ 2009 IEEE.

[6]TanayChoudhary, SaurabhKulkarni, PradyumnaReddy ,"*A Braille-Based Mobile Communication and Translation Glove for Deaf-blind People*" International Conference on Pervasive Computing (ICPC), 978-1-4799-6272-3/15/$31.00(c)2015 IEEE.Birla Institute of Technology & Science, Pilani - K.K. Birla Goa Campus Goa, India – 403726.

.

