



**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH  
TECHNOLOGY**

**CELLPHONE FOR VISUALLY IMPAIRED PEOPLE USING MICROCONTROLLER**

**Akshay Baghmar\*, Tousif Kazi, Prof. Nitin Deotale**

---

**ABSTRACT**

The mobile phones today have changed human lives in many ways. There is great need to extend various features provided by cell phones for blind person. We strongly believe that these benefits will contribute at large and will increase exponentially work efficiency for Visually Impaired People. Propose project is about a mobile cell phone design which shall act as essential handled device for visually Impaired People that can be used for reading SMS effectively. The main Objective behind this idea is to make the communicator as compact as possible so that it could be portable for VIP. The cell phones will be user friendly and the VIP's won't feel hesitated while using this kind of cellphones.

The proposed design would be the first of its kind as the new kind of display is being used which is made of Motor Matrix that is only designed for the Visually Impaired People. Having such a communicator this sightless person can read SMS with ease.

**KEYWORDS:** Cellphone, Braille language, Visually impaired people(VIP), Microcontroller, Decoder, Latches, DC motors.

---

**INTRODUCTION**

Mobile phone is a very useful invention. Today all the people are using mobile phones for their convenient the mobile phone is a very good technology for communication. Having mobile phone is a great advantage for communicating with friends and families from anywhere to all over in the world. By calling or sending messages from mobile phone we can easily able to connect with others without electricity. Now a day's SMS (short message service) is the most useful application. Today 80% of mobile phone users are using this data application. But the visually impaired people cannot able to use this application. In this project the visually impaired people can read message using mobile phone, and also this system help the blind people to send acknowledgment for the current incoming messages .This will be implemented by interfacing the Braille system with mobile phone.

**BRAILLE LANGUAGE**

It was invented by Louise Braille (1809-1852), who was blind and become a teacher of the blind. Braille is the system to write and read the words by touch for the visually impaired people. Old days the Braille system is used only for the reading purpose. Now only the system convert to use both read and write.

It consist of patterns of arranging dots in array manner and all the dots all arranged in 3x2 configuration. Each cell represents a particular letter or symbol and the combination of Braille cells mention the words or sentences. There are number of different versions of Braille: Grade 1 is consists of 26 letters of standard alphabets and punctuations. This is first starting system for the blind people. Grade 2 is also consists of 26 letters standard alphabet and punctuation. Also this grade has the contractions. Braille page cannot fit into printout page. So using contractions we match the Braille and take printout pages. Grade 3 is mainly used for personal letters, diaries and also literature. This type of shorthand written is mostly used for the message applications.

**BRAILLE CODE**

Braille code is the world first binary encoding scheme to represent the letters in the writing system. The system is invented by in two parts: In the French language, character encoding is used for mapping characters in the form of six dots. By raising the dots they can identify their characters.

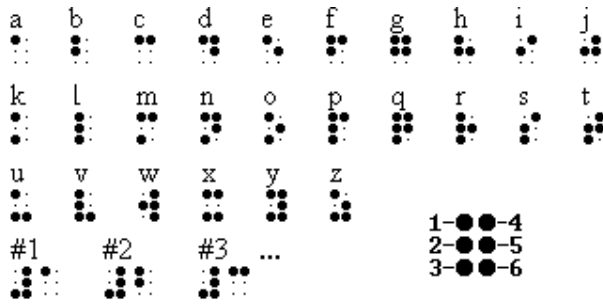


Fig 1 : Braille alphabet (English Braille American edition)

**LITERATURE SURVEY**

At present there is no complete cell phone for blind people which they can use with ease. But searching on internet we came to know that once the proposed model was designed as a communicator for unsighted people but proposed model was not effective and portable enough. After visiting various Blind schools and observing stencils used by blind students we made the necessary updates in the project. The devices which are available are either not user-friendly or a high end costly device. Many visually impaired people are been using the standard cell-phone to make call but as we know that these phones are having the LCD screen so the visually impaired people are not being able to read the SMS. Another option to read the SMS for them is to have the option of "Read SMS" but not all phones are having this facility. Besides of having these options the Cell-phones are not that convenient to use. The proposed design would be the first of its kind as the new kind of displays are being used which is only designed for this visually impaired persons. Having such a communicator this sightless persons can make calls and SMS and vice versa.

**PROPOSED MODEL**

The block diagram and the flow chart will help us to understand the working of our project. Further the architecture will complete the proposed model.

**BLOCK DIAGRAM**

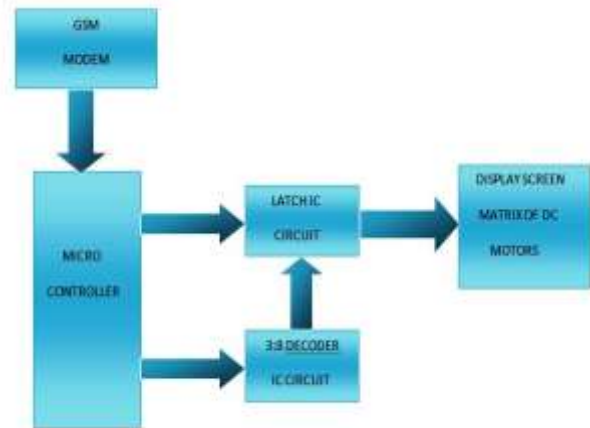


Fig No. 2 Block Diagram

Now referring the block diagram in fig no. 2, the GSM module sends 8 bit ASCII Code to microcontroller. Microcontroller converts 8 Bit ASCII Code to Braille language according to the look-up table which is stored in its memory and transfer it to latch IC through decoding selection. Decoder will select 74373 latches IC at a time while disabling all other latch ICs. The selected Latch IC will give input to Braille display through which blind person can read the message. For example the message "HIE" has been taken and now the ASCII code for "H" is 01001000 now the microcontroller converts this ASCII code to braille code of "H" which is 110010 which is stored its memory and transferred to the latch IC and from there to the braille motor display. Similarly "I" and "E" is displayed on the following braille pad. There is one innovative feature in our proposed system which we call braille phone locator, Assume one condition if blind person forgot the location of mobile where they kept then this feature come in function, he/she just need to press button of the circuit which we have provided to wear on wrist.

After pressing this button four bit binary code get generated which is uniquely coded and transmitted via RF frequency in 100 meters of range, cell phone is in build with RF receiver which can sense the signal and trigger an ringtone. In this way the blind person can locate the phone easily .

**Flow Chart**

The steps required to read the messages from device are as shown below.

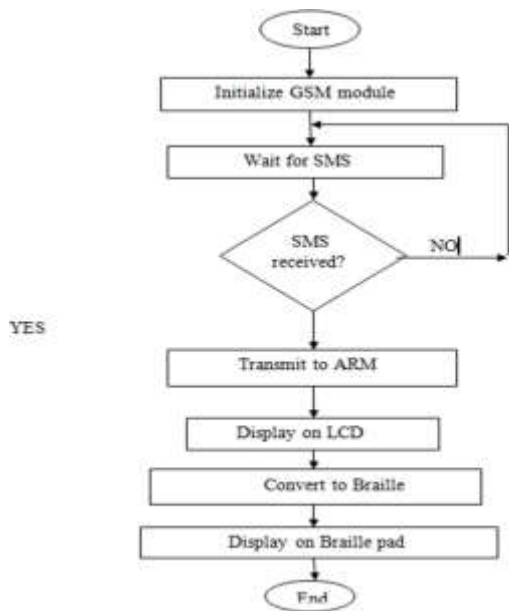


Fig no. 3 Flow chart

**ARCHITECTURE DESIGN**

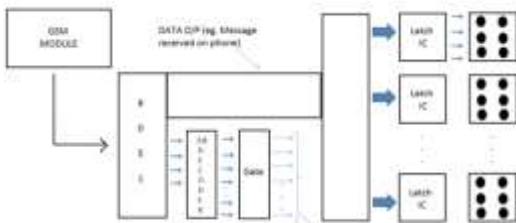


Fig no.4 Architecture Design

Here Fig no. 4 gives us the detailed idea about the architecture design of the proposed model.

**COMPONENTS**

**GSM Module**



Fig No. 5 GSM Module

It is use to provide serial data through 9-pin connector to serial to parallel converter(74164).it provide data in form of 7bit ASCII Code. It works on AT-commands which are given through laptop or computer. Full Type Approved Quad Band Embedded GSM Module (GSM 850/900 1800/1900) with AT command set and RS232 interface on CMOS level. This GSM wireless data module is the ready a solution for remote wireless applications, machine to machine or user to machine and remote data communications in all vertical market applications.

**Other Features :**

Highly Reliable for 24x7 operations with Matched Antenna .

Status of Modem Indicated by LED .

Simple to Use & Low Cost.

Quad Band Modem supports all GSM operator SIM cards.

**Microcontroller 89v51**



Fig No. 6 AT89v51

**Features:**

- 80C51 Central Processing Unit 5 V
- Operating voltage from 0 MHz to 40 MHz
- 16/32/64 kB of on-chip Flash user code memory with ISP (In-System Programming) and IAP (In-Application Programming)
- Supports 12-clock (default) or 6-clock mode selection via software or ISP
- SPI (Serial Peripheral Interface) and enhanced UART
- PCA (Programmable Counter Array) with PWM and Capture/Compare functions

- Four 8-bit I/O ports with three high-current Port 1 pins (16 mA each)
- Three 16-bit timers/counters
- Programmable watchdog timer
- Eight interrupt sources with four priority levels
- TTL- and CMOS-compatible logic levels
- Brown-out detection
- Low power modes
- Power-down mode with external interrupt wake-up
- Idle mode

Microcontroller converts 7 Bit ASCII Code to Braille language and transfer it to latch IC through decoding selection.

**Decoder 3:8**

A decoder is a device which does the reverse operation of an encoder, undoing the encoding so that the original information can be retrieved. The same method used to encode is usually just reversed in order to decode. It is a combinational circuit that converts binary information from n input lines to a maximum of 2n unique output lines.

In digital electronics, a decoder can take the form of a multiple-input, multiple output logic circuit that converts coded inputs into coded outputs, where the input and output codes are different. e.g. n-to-2n, binary-coded decimal decoders. Enable inputs must be on for the decoder to function, otherwise its outputs assume a single "disabled" output code word. Decoding is necessary in applications such as data multiplexing, 7 segment display and memory address decoding.

Decoder will select 74373 latches IC at a time while disabling all other latch ICs. AT89S51 is 8 bit microcontroller. It is used to convert 7 bit ASCII code into bit Braille format. It accepts 8 bit parallel data from serial to parallel converter (74164) and converts it into 6 bit parallel data which is given as input to all the latch ICs(20 ICs).

**Small Motor**

These days miniature vibrating motors are used in a wide range of products like cell phones, scanners, medical instruments, GPS, and control sticks. These motors are used in project as a sensing element for blind. By feeling its rotation, it is trying to transfer some information

The internal motor design is the same as our standard DC vibration motors, so you can expect the same high performance. An advantage to enclosing the motor,

aside from having no external moving parts, is the increased resistance to dirt and larger particles compared with regular DC vibration motor designs. Enclosed motors differ from encapsulated motors because they do not have sealed and water resistant casings. However, one of their biggest benefits is that their encasing includes mounting fixtures to easily screw and secure the motor in order to vibrate panels and housings such as hoppers or containers. The ratings of single motor are:

Voltage = 3 volts

Current consumption = 250 Ma

Power rating 3v\*250mA = 750mw

**ASCII TO BRAILLE CONVERSION**

The GSM modem only understands the ASCII codes where as we know that visually impaired people understand their unique braille language. So, we need a better conversion table that can be used here. The following conversion table would be required by us to program the micro-controller.

| Sign | ASCII Code | Braille Code | Binary Code |
|------|------------|--------------|-------------|
| 0    | 20         | 1011100      | 0010100     |
| 1    | 21         | 10001100     | 0011111     |
| 2    | 22         | 10011100     | 0011101     |
| 3    | 23         | 10010100     | 0010001     |
| 4    | 24         | 10001100     | 0010100     |
| 5    | 25         | 11000100     | 0010101     |
| 6    | 26         | 11000000     | 0011000     |
| 7    | 27         | 11000100     | 0011001     |
| 8    | 28         | 1011000      | 0010000     |
| 9    | 29         | 1011000      | 0010001     |

| Number | ASCII Code | Braille code | Hexadecimal |
|--------|------------|--------------|-------------|
| 0      | 30         | 10110000     | 0010000     |
| 1      | 31         | 01111100     | 0010001     |
| 2      | 32         | 00111100     | 0010010     |
| 3      | 33         | 01111000     | 0010011     |
| 4      | 34         | 01110000     | 0010100     |
| 5      | 35         | 01110100     | 0010101     |
| 6      | 36         | 00111100     | 0010110     |
| 7      | 37         | 00110000     | 0010111     |
| 8      | 38         | 00110100     | 0011000     |
| 9      | 39         | 10111000     | 0011001     |

| Alphabet | ASCII Code | Braille Code | Binary Code |
|----------|------------|--------------|-------------|
| A        | 41         | 01111000     | 01000001    |
| B        | 42         | 00111100     | 01000010    |
| C        | 43         | 01111000     | 01000011    |
| D        | 44         | 01110000     | 01000100    |
| E        | 45         | 01110100     | 01000101    |
| F        | 46         | 00111000     | 01000110    |
| G        | 47         | 00110000     | 01000111    |
| H        | 48         | 00110100     | 01001000    |
| I        | 49         | 10111000     | 01001001    |
| J        | 4A         | 10110000     | 01001010    |
| K        | 4B         | 01011100     | 01001011    |
| L        | 4C         | 01011000     | 01001100    |
| M        | 4D         | 01011000     | 01001101    |
| N        | 4E         | 01010000     | 01001110    |
| O        | 4F         | 01010100     | 01001111    |
| P        | 50         | 00011000     | 01010000    |
| Q        | 51         | 00010000     | 01010001    |
| R        | 52         | 00010100     | 01010010    |
| S        | 53         | 10011000     | 01010011    |
| T        | 54         | 10010000     | 01010100    |
| U        | 55         | 01001100     | 01010101    |
| V        | 56         | 00001100     | 01010110    |
| W        | 57         | 10100000     | 01010111    |
| X        | 58         | 01001000     | 01011000    |
| Y        | 59         | 01000000     | 01011001    |
| Z        | 5A         | 01000100     | 01011010    |
| a        | 61         | 01111000     | 01100001    |
| b        | 62         | 00111100     | 01100010    |
| c        | 63         | 01111000     | 01100011    |
| d        | 64         | 01110000     | 01100100    |
| e        | 65         | 01110100     | 01100101    |
| f        | 66         | 00111000     | 01100110    |
| g        | 67         | 00110000     | 01100111    |
| h        | 68         | 00110100     | 01101000    |
| i        | 69         | 10111000     | 01101001    |
| j        | 6A         | 10110000     | 01101010    |
| k        | 6B         | 01011100     | 01101011    |
| l        | 6C         | 00011100     | 01101100    |
| m        | 6D         | 01011000     | 01101101    |
| n        | 6E         | 01010000     | 01101110    |
| o        | 6F         | 01010100     | 01101111    |
| p        | 70         | 00011000     | 01110000    |
| q        | 71         | 00010000     | 01110001    |
| r        | 72         | 00010100     | 01110010    |
| s        | 73         | 10011000     | 01110011    |
| t        | 74         | 10010000     | 01110100    |
| u        | 75         | 01001100     | 01110101    |
| v        | 76         | 00001100     | 01110110    |
| w        | 77         | 10100000     | 01110111    |
| x        | 78         | 01001000     | 01111000    |
| y        | 79         | 01000000     | 01111001    |
| z        | 7A         | 01000100     | 01111010    |

Fig No. 7 ASCII Code table

**CONCLUSION**

In this project we proposed a model which we are implementing as our final year project. In the proposed system we are trying to make it adaptable to the changing technology and new modern technology. Like the wrist wear phone locator, watch, calculator. There are various similar type of paper on this idea but none is been implemented. We on the other hand trying to make the the model useable, compatible and affordable at the same time which can be readily used by visually impaired people accordingly.

**ACKNOWLEDGMENT**

It has been a sincere desire of every individual to get an opportunity to express his views, skills, attitude and talent in which he is proficient so as to give him satisfaction and confidence in his ability to do or produce something useful For mankind. A Paper is one such avenue through which an engineer gives vent to his feelings and expressions. We take this opportunity to express our gratitude towards our internal guide Prof. Nitin Deotale, without the encouragement and guidance of whom we would have found it difficult to maintain the tempo and enthusiasm necessary for our endeavour. Working with him has been a wonderful learning experience.

We also want to express our deepest gratitude to all the visually impaired students who helped us to make our project effective, who inspired us to make a project for social good.

**REFERENCES**

1. Braille for the sighted(Beginning braille) by Stan Collins, May 1, 1998
2. Ayala, Kenneth J., The 8051 Microcontroller- Architecture, Programming and Applications, 3rd edition, 2008, Cengage Learning India Pvt. Ltd.
3. Mazidi, Muhammad Ali, Mazidi, JaniceGillispie and McKinlay,Rolin D. The 8051 Microcontroller and Embedded Systems(using assembly and C), 2nd Edition, 2008, Pearson Education.
4. Dr Ramani Kalpathi and Ganesh Raja, "Microcontrollers and Applications" 1 rev. edn, Sanguine Technical Publishers, 2008.
5. R.G. HIBBERED, Integrated Circuits, McGraw Hill, New York
6. Holtek HT12D/HT12F 212 series decoder datasheet
7. Holtek HT12A/HT12E 212 series encoder datasheet
8. Philips 74HC137 3-to-8 line decoder datasheet