International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 04 | April - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Advanced SMS System for Blind People Using Braille Pad

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Abstract - The ability to communicate through text messages is a fundamental aspect of modern life. However, for visually impaired individuals, interacting with text-based mobile services such as Short Message Service (SMS) can be a significant challenge. This research proposes an advanced SMS system that utilizes a Braille pad interface to enable blind users to send and receive text messages independently and efficiently. The system is designed with a refreshable Braille display that dynamically converts incoming SMS messages into tactile Braille characters. Users can read these messages through touch, offering an intuitive and accessible method for message consumption.

For outgoing messages, the system provides multiple input options including a Braille keypad and speech-to-text functionality, catering to users with varying levels of Braille literacy and comfort with technology. The system is powered by a micro controller and incorporates a GSM module for SMS transmission and reception. The design emphasizes low cost, portability, and ease of use to ensure widespread applicability in both urban and rural contexts.

***Key Words*: Assistive Technology, Braille Display, Visually Impaired, SMS Communication, Braille Pad, Blind Accessibility, Tactile Interface, GSM Module, Voice-to-Text, Inclusive Design, Human-Computer Interaction, Digital Accessibility**

1. INTRODUCTION

Braille itself has been instrumental in making possible the integration of blind people into society, and, in turn, this increased integration has driven developments in the use and production of Braille. The more integrated that blind people have become, the greater are the demands placed on sources of literacy.

Despite of all these advancements in the telecommunication field, the blind people have limited access for the 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.

The system is specially designed for the visually impaired community to connect, communicate and socialize without vision .Enabling those who are blind to accomplish important tasks with just their touch via a comprehensive eye free. Now a day physically impaired people have no access of advanced communication technologies. To aware the blind peoples with the advance telecommunication system, our approach focused on design a Short Message Service (SMS) system for them, it interface Braille pad with the cell phone. For receiving a SMS, the microcontroller IC AT89S52 is used which converts the typed English alphabets to the Braille letter using the Lookup table.

2. IMPLEMENTATION

2.1 Hardware Implemented

The person sends the message to the blind person's mobile number which is connected via microcontroller which reads the message using GSM module which operates on AT commands and then converts the letters received in the message into the Braille language using the lookup table in its memory. With the help of 6 relays Microcontroller rotates the Braille motors on which the blind person can read the message. LCD helps verification of the system response.

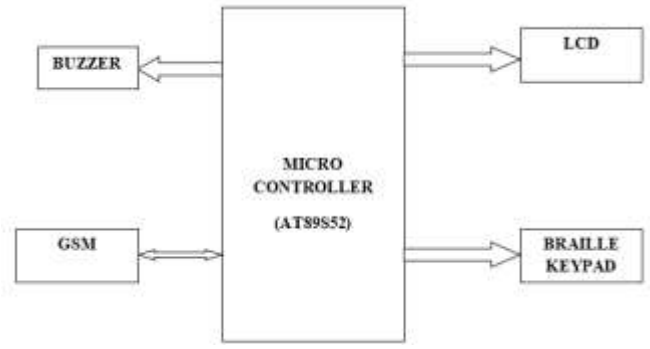

Figure 1 : Block diagram of the Research work

2.1.1 MICROCONTROLLER

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. It used for conversion of letters sent and received and for power supply for other parts of the system.

2.1.2 GSM (Global System for Mobile Communications)

GSM module is a digital telephony system used to transmit and receive the information by the user wirelessly. For our system we have used sim900 GSM module.

2.1.3 ALCD

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.

2.1.4 Relays

A relay is usually an electromechanical device shown in figure 6 that is actuated by an electrical current. The current flowing in one circuit causes the opening or closing of another circuit. Relays are like remote control switches and are used in many applications because of their relative simplicity, long life, and proven high reliability. Relay contain a sensing unit, the electric coil, which is powered by AC or DC current. When the applied current or voltage exceeds a threshold value, the coil activates the armature, which operates either to close the open contacts or to open the closed contacts. When a power is supplied to the coil, it generates a magnetic force that actuates the switch mechanism. The magnetic force is, in effect, relaying the action from one circuit to another.

2.1.5 DC motors

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. Here we used dc motors to sense the SMS letters in Braille letters.

2.1.6 Buzzer

It is an audio signaling device which may be mechanical, electromechanical or piezoelectric. Buzzer buzzes whenever the system is turned on and when the message is received to indicate the user for reading of the message.

2.2 Software

This Proposed System uses Keil software to convert Embedded C programme to machine level. The Keil tool kit includes three main tools, assembler, compiler and linker. An assembler is used to assemble the Embedded C program. A compiler is used to compile the C source code into an object file. A linker is used to create an absolute object module suitable for our in-circuit emulator.

3. FLOW DIAGRAM

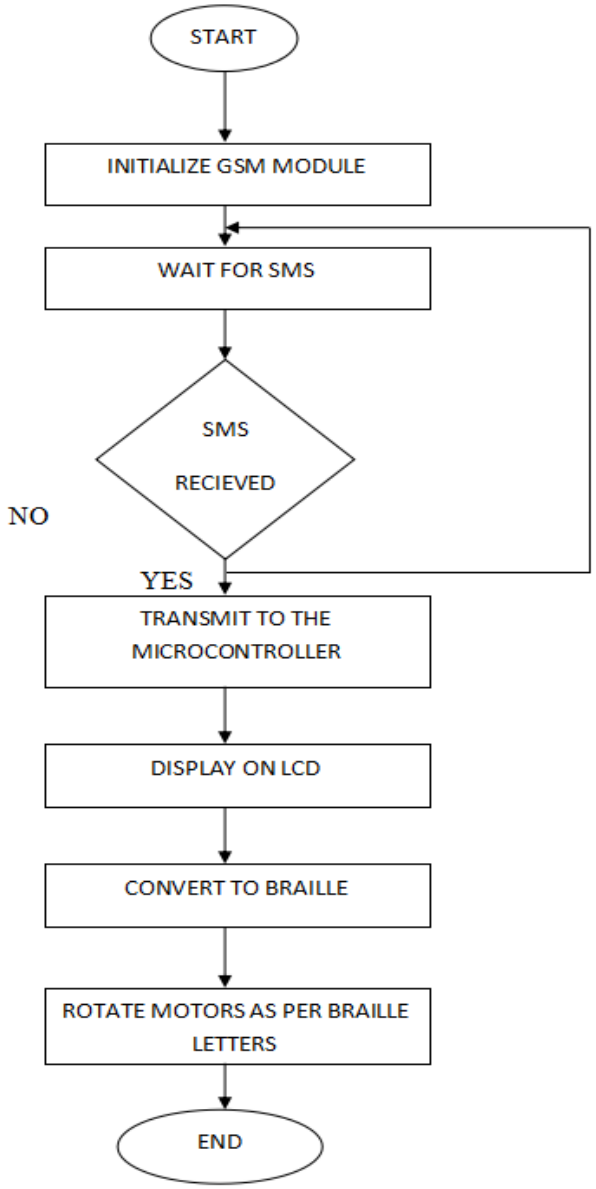

Figure 2 : Flow Diagram and Process of the Research work

Keil is an IDE(Integrated Development Environment) which is used to develop an application program,complile and run it.Even the code can be debugged.

It is a simulator where we can check the application code even in the absence of hardware board.
In our design the main heart of hardware module is microcontroller which is the programmable IC.The programming language used for developing the software to the microcontroller is Embedeed C/Assembly.The KEIL cross compiler is used to edit,compile and debug this program.Micro Flash programmer is used for burning the developed code on Keil in to the microcontroller chip.

4. CONCLUSION

This research presents an innovative SMS communication system designed specifically for visually impaired individuals, integrating a refreshable Braille pad to provide an accessible and user-friendly interface. By converting incoming text messages into tactile Braille and offering intuitive input methods for sending messages, the system enables blind users to engage in seamless and independent communication. The integration of hardware components such as a microcontroller, GSM module, and Braille actuators has resulted in a functional, low-cost, and portable solution suitable for everyday use.

Case 1: When the system is turned on the title of our project BRAILLE SYSTEM IMPLEMENTATION is displayed on 16x2 LCD.

Figure 3 : BRAILLE SYSTEM IMPLEMENTATION is displayed on 16x2 LCD.

Case 2: When GSM is ACTIVE and INITIALIZED a message is displayed on lcd.

Figure 4 : GSM INITIALIZED a message is displayed on LCD

Case 3: After GSM activation and initialization the system waits for SMS and it is displayed on LCD as WAITING FOR SMS.

Figure 5 :System waits for SMS and it is displayed on LCD as WAITING FOR SMS.

Case 4: If the message received by GSM is HELLO then the LCD displays MESSAGE RECEIVED HELLO.

Figure 6 : LCD displays MESSAGE RECEIVED HELLO.

Case 5: The received SMS is displayed on LCD character by character and corresponding motors will rotate according to Braille pattern.

Figure 7: The SMS displayed on LCD Characters in Braille pattern

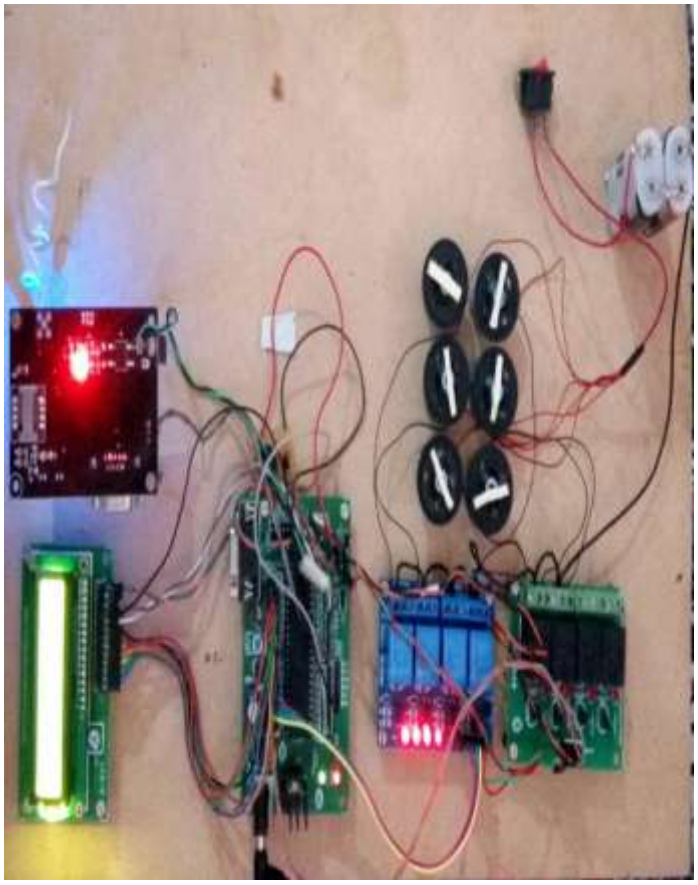

Figure 8 : The Prototype & implementation of the proposed System

The proposed system bridges the communication gap for visually impaired individuals by converting SMS text into tactile Braille characters. Utilizing GSM and microcontroller technologies, it enables blind users to receive and send messages independently. This innovation enhances accessibility and empowers visually impaired individuals to engage more effectively in modern communication.

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Geethanjali G is committed to fostering an engaging learning environment that encourages critical thinking and practical application of theoretical concepts. She integrates modern teaching methodologies to enhance student learning experiences.

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