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NEXT GENERATION BRAILLE SYSTEM IMPLIMANTATION: MOBILE COMMUNICATION DEVICE FOR THE BLIND

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Abstract - *The telecommunication technology has become the integrated part of our day today life. It has completely revolutionaries 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 people and the technological advancement in the telecommunication field we decided to design a SMS system for them by interfacing Braille pad with the cell phone so that dual impaired person can have the access to the SMS system. Here the user sends the SMS to the blind person's mobile number which is connected to the microcontroller which reads the SMS using GSM module through the AT commands and then converts the letters of the SMS into the Braille language using the lookup table in its memory. With the help of 6 relays Microcontroller vibrates the Braille pad on which the blind person can read the SMS. For sending a SMS, the µC converts the typed Braille letter on Braille pad to the English alphabets using the Lookup table. Loud speaker is also used for making the voice announcement. It is a low cost, Low latency, quick response time, fully automate system, robust system, low power requirement are some advantages of the system. However this system is a bit bulky and handy. As it reads the SMS character by character, so it's a slow process. Still it can become a great benefit to the blind persons. The system can be further modified to read the whole SMS in a string of words and also blind person can read an e-mail.*

Key Words**: Vibrating Motors, Digital Braille, PIC Controller, GSM technology, LCD display.**

1. INTRODUCTION

Mobile cell phones are the milestone in telecommunication technology. Despite of all these advancement in the telecommunication field, the physically impaired people have limited access for these technologies. We decide to design a Short Message Service (SMS) system for them. For that we are using Braille language as the basis of the project. Braille is a tactile writing system used by the blind and visually impaired. Braille characters are small rectangular blocks called as cells that contain tiny palpable bumps called raised dots. The number and arrangement of these dots distinguish from one character to another. We are designing a modular device using which blind-deaf people can send and receive message without any support of others. The basic grid of a Braille alphabet character consists of six cells, positioned like the figure six on a die, in two parallel vertical lines of three dots each using which 64 different signs can be created. In our modular design we are representing cells in the form of vibrator motors.

The basic grid of a Braille alphabet character consists of six vibrators, positioned like the figure six on a die, in two parallel vertical lines of three dots each. From the six vibrators that make up the basic grid, 64 different signs can be created. Reading direction of Braille is the same as for regular type and the rules for hyphenation that apply for regular fonts also apply in Braille In un-contracted Braille, each individual letter of the alphabet, punctuation mark etc. is represented by its own Braille character(s).

This project uses regulated 5V, 500mA power supply. Unregulated 12V DC is used for relay. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

1.1. LITERATURE REVIEW

The refreshable braille display model developed in

[1]used rotary actuators and stepper motors. The braille cell consisted of eight pins. Four stepper motors were used to control the pins. Each stepper motor was provided with its own driver IC. An 8051 microcontroller was used to control the four stepper motors. The stepper motors used draw very high mount of current. The microcontroller cannot provide or handle this amount of current hence the driver IC is used. However, these are highly complicated and intense.

The model proposed in [3] implemented a refreshable Braille display controller that utilized Arduino because it is easily programmable. The controller for the refreshable Braille display developed had been designed for multiple Braille cells. The system used Arduino that was pre-programmed with English and Devanagari text to actuate braille cells consisting of 6 light emitting diodes. The use of LEDs was inefficient and impractical for the visually impaired. The system implemented was not portable due to the use of many components.

Awang Damit in [4] developed an education tool for visually impaired where the input was taken from user and the

corresponding braille code in either English or Arabic was conveyed using solenoid pins. The system had three main components—input unit, control unit and output unit. Microcontroller PIC16F877A was used as the control unit. The output unit consisted of 6 pin solenoids and Liquid Crystal Display (LCD). The model implemented did not take large inputs at once and was incapable of mapping the characters to braille at a convenient pace. The use of PIC16F877A microcontroller is expensive and inconvenient when compared to Arduino microcontrollers which are easy to use and program.

The proposed system in [5] was based on the concept of one Braille cell, since Braille reading is done character by character. Marcelo Bernart Schmidt developed a system with integrated hardware and software to provide digital access of braille for the visually impaired people. The Braille cell was formed by six PWM (Pulse Width Modulation) servos with six steel needles at its axes. Servos were actuated by an

Arduino based platform that receives the characters to be represented on the cell through the serial port of a computer. The single braille cell was big which is not portable. The system was customized for each user which was expensive.

The braille display developed in [7] consisted of six piezoelectric linear motors, a cover frame, a body frame, and a circuit frame. The actuator used in this was piezoelectric linear motors. The braille display system consisted of the user interface including the input device, the braille control board that converted the input information into the control signal to the braille cells, and the braille display unit providing tactile information. Actuation of piezoelectric linear motor requires a PWM signal of 60V supplied to the piezoelectric material. Such a high voltage is likely to cause an increase in the size and cost of the controller.

2. PROPOSED SYSTEM

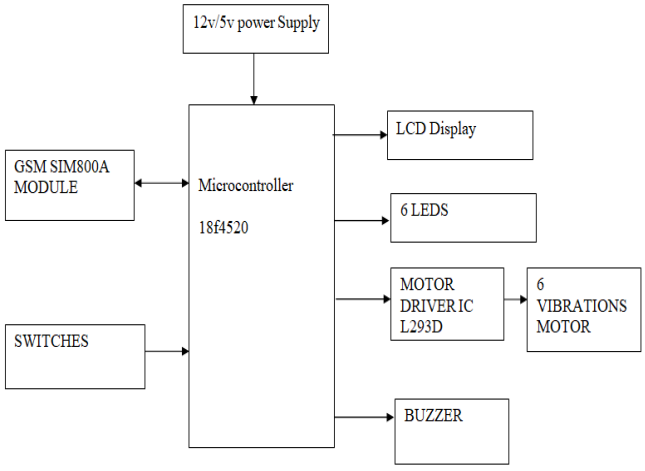

Fig 1: **Block Diagram of System**

In this project we are developing a new methodology in Braille system in order to read messages for Blind people. Here we are using GSM modem to receive messages the content/letters of the message can be read by blind people easily just by feeling the vibration of vibrators using in this project and the same we are going to display on LCD as well. Alert vibrator is working as message alerter and Buzzer is for hearing alert.

The basic grid of a Braille alphabet character consists of six vibrators, positioned like the figure six on a die, in two parallel vertical lines of three dots each. From the six vibrators that make up the basic grid, 64 different signs can be created. Reading direction of Braille is the same as for regular type and the rules for hyphenation that apply for regular fonts also apply in Braille In un-contracted Braille, each individual letter of the alphabet, punctuation mark etc. is represented by its own Braille character(s).

A. PIC 18f4520 microcontroller:

Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF

- Divided into 256-byte banks
- There are total of F banks
- Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bits
- Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
- Program memory stores the program and also static data in the system.
- On-chip External
- On-chip program memory is either PROM or EEPROM.
- The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
- Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

Fig -2: **PIC18f4520**

B. VIBRATOR MOTORS:

An Eccentric rotating mass vibration motor (ERM) uses a small unbalanced mass on a dc motor, when it rotates it creates a force that translates to vibration. A miniature DC vibration motors have the benefit of being easy to implement and are low cost. A small vibration motor can be integrated into a design so that equipment operators and users can rely on the sense of touch, no longer requiring line of sight or high volumes. This is one of the obvious benefits with mobile phones, you can receive notification when a device is in your pocket without disputing those around you.Now there are a wide range of application that use this tiny vibration motors to offer vibration alert notification and haptic feedback.

Fig -3: **VIBRATOR MOTORS**

C. BUZZER:

A Buzzer is a device which makes buzzing or beeping noise. There are several kinds; the most basic is piezoelectric buzzer, which is just a flat piece of piezoelectric material with two electrodes. This type of buzzer requires some kind of oscillator to drive it. They are cheap and can be very loud without using very much power. Piezoelectric materials also produce a voltage in response to pressure, so piezo electric buzzer can also be used as crude pressure sensor or microphones. Typical use of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

Fig -4: **BUZZER**

D. LCD display:

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

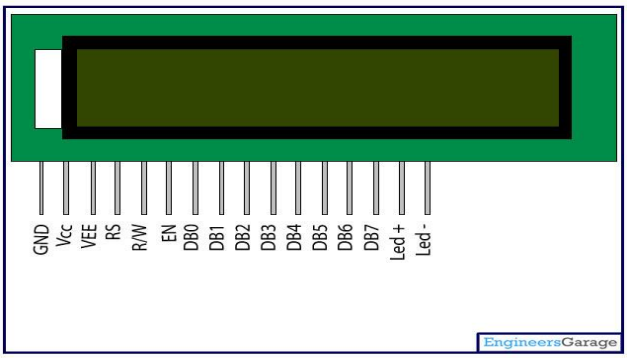

Fig -5 LCD display

E. GSM module:

This GSM modem has a **SIM800A chip and RS232** interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open an connection to that COM port at 9600 baud rate, which is the default baud rate of this modem.

Fig -6 GSM Module

3. CONCLUSIONS:

Thus we conclude from above study that with some modifications in conventional communicating device, we can include large no. of physically challenged people in communication system. 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 by interfacing Braille pad with the cell phone so that dual impaired person can have the access to the SMS system. With the help of 6 relays Microcontroller vibrates the Braille pad on which the blind person can read the SMS. It is a low cost, Low latency, quick

response time, fully automate system, robust system, low power requirement are some advantages of the system.

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