# Braille Keypad

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*Abstract*—The aim of the project is to create a small portable device which will act as a braillic note taker and enable the user to access internet for sending or recieving email and it can also be used as remote to control various home appliences. The system comprises of a braillic device, a host which may be a computer or ARM board and a slave device.

*Keywords—Braille; Keypad; Note taker; Microcontroller*

## I. INTRODUCTION

Braille is a system of raised dots that can be read with the fingers by people who are blind or who have low vision. Teachers, parents, and others who are not visually impaired ordinarily read Braille with their eyes. Braille is not a language. Rather, it is a code by which many languages—such as English, Spanish, Arabic, Chinese, and dozens of others—may be written and read. Braille is used by thousands of people all over the world in their native languages, and provides a means of literacy for all.

Technological developments in the computer industry have provided and continue to expand additional avenues of literacy for Braille users. Software programs and portable electronic Braille devices allow users to save and edit their writing, have it displayed back to them either verbally or tactually, and produce a hard copy via a desktop computer-driven Braille embosser. Because the use of computers is so common in school, children learn both the Braille contractions and also how to spell words out letter for letter so they can spell and write using a keyboard.

The aim of the project is to create a small portable device which will act as a Braille note taker and enable the user to access internet for sending or receiving email and it can also be used as remote to control various home appliances. The system comprises of a Braille device, a host which may be a computer or ARM board and a slave device.

The proposed system can be used to store data to a host computer through a Braille keypad as well as enables wireless device control. The proposed device will be less costly and will be very small as compared to the existing Braille note takers.

## II. BRAILLE SYSTEM

Braille is a tactile form of reading and writing used by people who are blind or vision impaired. It was invented by Louis Braille in 1829.Braille is based on a six dot cell with two columns of three, like the six on a dice. The dots in the first column are numbered 1, 2 and 3 from the top down; and the dots in the second column are numbered 4, 5 and 6 from the top down. By using any number of these six dots 63

different patterns can be formed (64 combinations are possible if you include no dots).
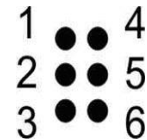


The Braille alphabet is made up of 26 different combinations of the Braille cell, each combination of dot(s) representing a letter of the alphabet. The Braille alphabet is made up of three sequences. The first sequence for letters a to j use the top and middle rows, cells 1, 2, 4 and 5 (below):



The second sequence for letters k to t are formed by adding dot 3 to the first 10 letters:
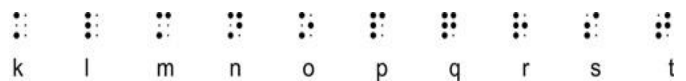


The remaining letters, with the exception of "w", are formed by adding dots 3 and 6 to the first 5 letters of the Braille alphabet:
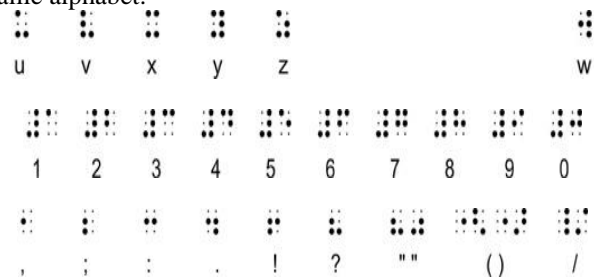


## III. PROPOSED SYSTEM

Our proposed system is a small portable Braille keypad which can be used as a note taker as well as a wireless remote controller to control various home appliances for the blind. Braille technology is assistive technology which allows blind or visually impaired people to do common tasks such as writing, browsing the Internet, typing in Braille and printing in text, engaging in chat, downloading files, music, using electronic mail, burning music, and reading documents. It also allows blind or visually impaired students to complete all assignments in school as the rest of sighted classmates and allows them take courses online. It enables professionals to do their jobs and teachers to lecture using hardware and

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software applications. The advances of Braille technology are meaningful because blind people can access more texts, books and libraries and it also facilitates the printing of Braille texts. The system comprises of a Braille device, a host which may be a computer or ARM board and a slave device. This system can also be used to control various electronic appliances wirelessly using some special keys on the Braille keypad.It is designed to be operated in 2 modes. In mode 1, the system is designed to act as a Braille device and in mode 2 the system is designed to work in the device control mode.The proposed device will be less costly and will be very small as compared to the existing Braille note takers.

## IV. COMPONENTS USED

### 1) ARM MICROCONTROLLER

LPC2148 is the widely used IC from ARM-7 family. It is manufactured by Philips and it is pre-loaded with many inbuilt peripherals making it more efficient and a reliable option for the beginners as well as high end application developer.

### 2) PIC MICROCONTROLLER

The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction execution, 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

### 3) RF TRANCEIVERS

The RF module, as the name suggests, operates at Radio Frequency In generally, the wireless systems designer has two overriding constraints: it must operate over a certain distance (50-100m) and transfer a certain amount of information within a data rate. The RF modules are very small in dimension and have a wide operating voltage range i.e. 3V to 12V.

### 4) MAX 232

The MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC .The controller operates at TTL logic level(0-5V) whereas the serial communication inPC works on RS232 standards(-25V to+25V).

### 5) RELAY

A relay is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current. The heart of a relay is an electromagnet (a coil of wire that becomes a temporary magnet when electricity flows through it).

## V. BLOCK DIAGRAM

The Block diagram section consists of three parts – Keypad section, System section and Device control section
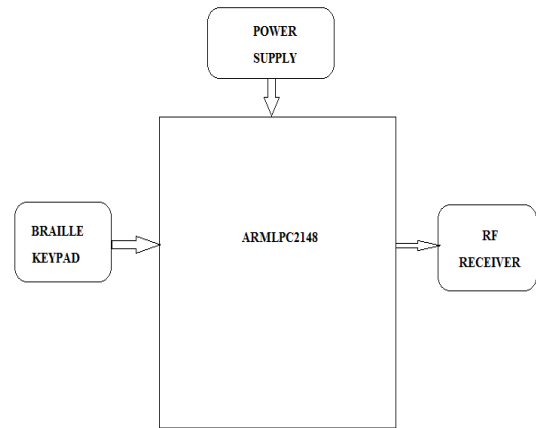
### A. KEYPAD SECTION



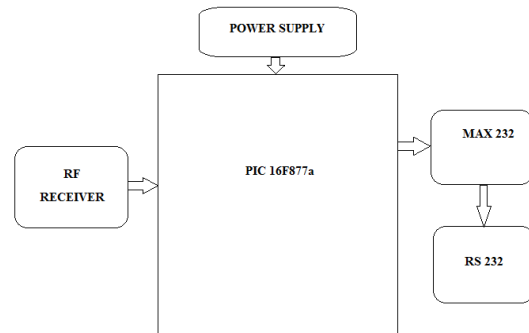Fig 5.1 Keypad Section

### B. SYSTEM SECTION
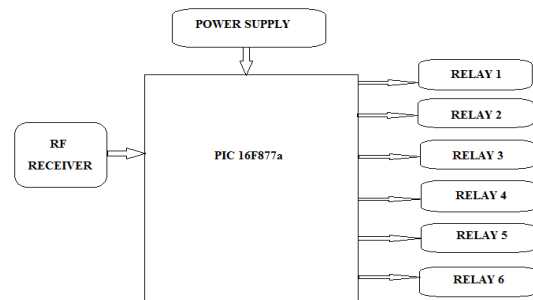


Fig 5.2 System Section

### C. DEVICE SECTION



Fig 5.3 Device Control Section

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## VI.   WORKING

The system consists of 3 sections –the keypad section, the system section and the device control section. The Braille keypad can be made to operate in 2 modes –Data storage mode and Device control mode. During mode 1, keypad section and system section comes into work and during mode 2, keypad section and device control comes into action.

### A.  MODE 1 OPERATION

In mode 1, the system is designed to act as a Braille device. The Braille device is attached to a Braille keyboard containing 6 keys to enter the Braille script. Some special keys are provided for special characters, for selecting uppercase, lowercase and numerals, for opening mails, device control, getting audio output etc.  Braille device is used to detect the key press and store the data entered. The alphabet will be detected by pressing the pattern keys followed by the enter key. This Braille keypad is attached to the microcontroller. The ARM Controller is used in keypad side where, inputs from the keypad while be given to the controller and these input data will be transmitted to the corresponding storage with the help of RF transmitter.

If a letter is entered it will give an audio output corresponding to that letter to a blue-tooth headset. Thus the person can recognize the accuracy of the entry. The data that is entered through the keypad will be transmitted to the system side board with the help of a RF transmitter. At the system side an RF receiver will receive the transmitted data from the keypad side.PIC Controller is used in both System side and Device controller side circuits .In System side the data received from the RF receiver is stored to a storage .These data can be stored permanently to a host (which will be a computer) with the help of RS232 and MAX232.The RS232 facilitates serial communication. The MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC .The controller operates at TTL logic level(0-5V) whereas the serial communication in PC works on RS232 standards(-25V to+25V).

This makes it difficult to establish a direct link between them to communicate with each other. The intermediate link is provided through MAX232. It is a dual driver/receiver that includes a capacitive voltage generator to supply RS232 voltage levels from a single 5V supply. Each receiver converts RS232 inputs to 5V TTL/CMOS levels. These receivers (R1 &R2) can accept 30V inputs. The drivers(T1 &T2),also called transmitters, convert the TTL/CMOS input level into RS232 level. The transmitters take input from controller's serial transmission pin and send the output to RS232's receiver .The receivers, on the other hand, take input from transmission pin of RS232 serial port and give serial output to microcontroller's receiver pin.MAX232 needs four external capacitors whose value ranges from 1uF to 22uF. This mode various applications like displaying the data on screen, text to speech conversion.

### B.  MODE 2 OPERATION

A slave device is interfaced to the system which is in turn interfaced with the 4 electronic devices which are to be controlled wirelessly. Separate codes are given for switching on and off each of the interfaced devices. By pressing the corresponding codes through the keyboard, the device can be controlled wirelessly. The key press will be detected by the microcontroller and transmitted using RF transmitter. This will be detected by the receiver at the device control side. The proposed device will be less costly and will be very small as compared to the existing Braille note takers.

## VII.   ADVANTAGES

*1)* The proposed system is less costlier than the existing systems.
*2)* The blind need not learn any extra script other than the usual Braille script and  is very simple to use .
*3)* The advances of Braille technology are meaningful because blind people can access more texts, books and libraries .
*4)* It also facilitates the printing of Braille texts,allows blind or visually impaired people to do common tasks such as writing, browsing the Internet, typing in Braille and printing in text, engaging in chat, downloading files, music, using electronic mail, burning music, and reading documents.
*5)* It also allows blind or visually impaired students to complete all assignments in school as the rest of sighted classmates and allows them take courses online.
*6)* The keypad is compact.
*7)* It is an effective system
*8)* It consumes less power.

## VIII.   CONCLUSION

The Braille keypad is a compact and cost effective keyboard as well as remote controller that can be used by the blind that allows blind or visually impaired people to do common tasks such as writing, browsing the Internet, typing in Braille and printing in text, engaging in chat, downloading files, music, using electronic mail, burning music, and reading documents. It also allows blind or visually impaired students to complete all assignments in school as the rest of sighted classmates and allows them take courses online. It enables professionals to do their jobs and teachers to lecture using hardware and software applications. The advances of Braille technology are meaningful because blind people can access more texts, books and libraries and it also facilitates the printing of Braille texts. Separate codes are given for switching on and off each of the interfaced devices. By pressing the corresponding codes through the keyboard, the device can be controlled wirelessly. The proposed device will be less costly and will be very small as compared to the existing Braille note takers.

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