

BLIND ASSISTANCE SYSTEM USING REFRESHABLE BRAILLE DISPLAY

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Abstract : The main objective of this paper aims at designing an affordable refreshable braille display for the blind and deaf-blind people. Blind assistance system also allows visually impaired people to do reading in Braille and documents. It is a portable device which can be used for indoor guidance system as well. Braille language is used mainly by the people who are blind and deaf blind. Blind and deaf-blind braille readers often prefer electronic braille displays which are not affordable and costly. In these paper we demonstrate that the braille embosser is a type of device which is very useful for initial stage braille language learner. Here, the input is in the alphabetical form which is converted into Braille language and displayed with the help of servomotors. This device detect the obstacles and also determine at what distance obstacle is, a blind person can safely use this device.

Index terms – Braille, Blindness, Microcontroller, Sensors

I. Introduction :

Blindness is the utmost misunderstood type of disability. Blind people also live a normal life with their own style of doing the things. But, they always face dilemmas due to inaccessible infrastructure along with the social challenges. The biggest test for a blind person, especially the one with the complete loss of vision, is to navigate around places.

Braille is the language which opens the door of literacy for the sightless people. Braille technology has been in the electronic world since several years. Traditionally, braille is printed on paper of heftier stock. A book or armory in braille is much larger than its print counterpart.[6] Braille language is a depiction of the writing system and cyphers made from "cells" of dots.[6]

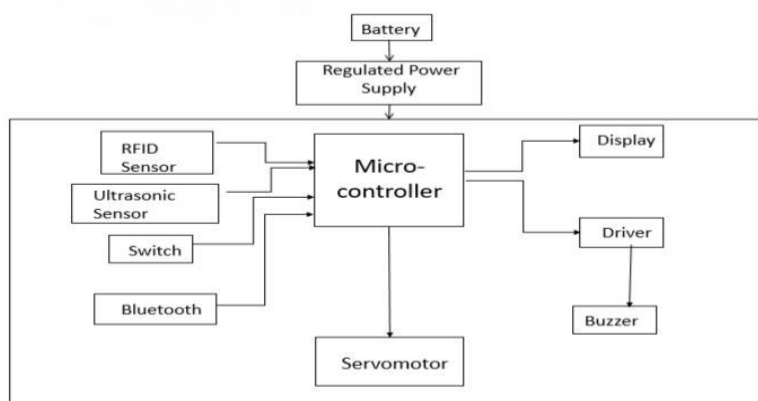
It is estimated that there are 40-45 million people blind world wide , in our country 15 million people are blind.[7] The value of a braille printer is directly related to the volume of braille it generates. Small-capacity braille imprinters costs between \$1,800 and \$5,000 and large-capacity ones may cost between \$10,000 and \$80,000.[8]

Braille is the language used mainly by people who are sightless or deaf- blind. All braille terms are made using 6 dot points which are arrange in rectangular form . There are currently many braille displays available in market but all of them are facing a major prolem like high cost, maintenance, so we propose a design in order to confront this challenge.

II. Refreshable Braille Display :

A refreshable braille display is an electro-mechanical device used for displaying braille inscriptions , usually by means of round-tipped pins upstretched through holes in a flat side.[9] Visually unsighted computer users who cannot use a computer monitor can use it to read text output. Deaf-blind computer users may also use refreshable braille display.[9]

III. Schematic Pattern :



[Type here]

figure1 : block diagram

3.1 PIC18f25k20 :

PIC is abbreviate as Peripheral Interface Microcontroller which is a family of microcontrollers made by microchip technology.[17]

It is originally invented by general instrument’s microelectronics division.[17] PIC microcontrollers can be programmed to carry out huge range of task.[17] To programmed PIC microcontroller PICPgm software is mainly used, which allows to program HEX file into PIC microcontroller. The PIC18f25k20 shows high performance PIC 18 family 8 bit powerful yet easy to program CMOS flash based Microcontroller.[11] It has standardized features including 32kb of addressable program memory size, 1536 bytes of data memory size, 25 general purpose I/O pins, 2 comparators and 10 channel 10 bit analogue-to-digital converter.[11] This device works at a maximum frequency of 64 MHz wide operating voltage of 1.8 to 3.6 V.[11]

3.2 RF ID Reader :

A Radio Frequency Identification Reader is used to collect data from an RF ID tag, which is used to track different things. Information is moved from tag to a reader by using radio-waves. The RF ID tag is necessary to be in the range of RF ID reader, which is of range 3 to 300 feet, RF ID equipment uses RF ID tag, which is created by integrated circuits containing a very small antenna for sharing information to an RF ID transceiver.[13] Frequency range for low frequency is between 125 to 134 kHz and 140 to 148.5 kHz, and high frequencies is between 850 to 950 MHz s and 2.4 to 2.5GHz.[13]

3.3 Ultrasonic Sensor :

Ultrasonic sensor module consists of one receiver and one transmitter. It is used to detect the objects by calculating its distance. These devices continuously transmit a short burst of ultrasonic sound to a goal, which imitate the sound back to the sensor.The system then measures the time for echo to return to the sensor and computes the distance to the target using the speed of sound within the medium.[14]

3.4 Bluetooth Module :

HC-05 is an easy to use Bluetooth Serial Port Protocol module, designed for transparent wireless serial connection setup.[15] The HC-05 Bluetooth Module can be used as a master or slave configuration, making it a good resolution for wireless communication. This serial port bluetooth module is wholly qualified Bluetooth V2.0 + EDR (enhanced data rate) 3Mbps Modulation with complete 2.4 GHz radio transceiver and baseband.[15] It uses CSR Bluecore 04- External single chip bluetooth system with CMOS technology and with Adaptive Frequency Hopping Feature.[15]

3.5 Servo-motors :

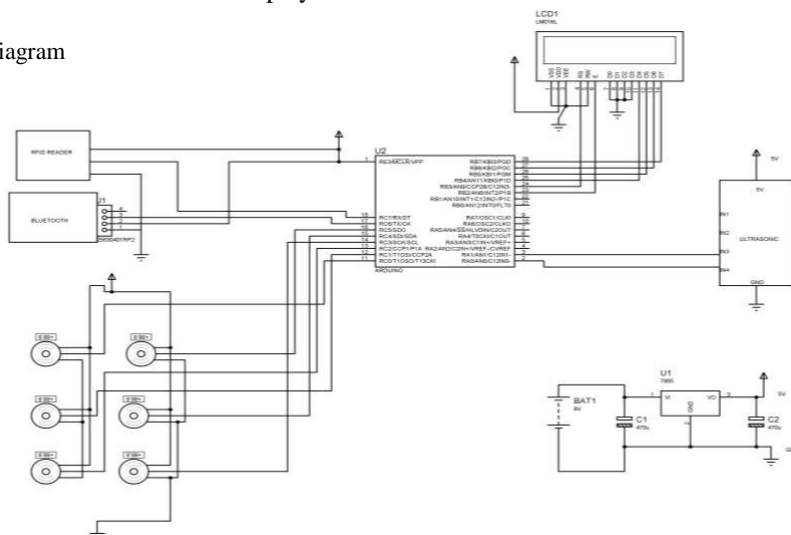
A servo-motor is a gyratory actuator or rectilinear actuator that allows defined mechanism of angular or linear position, rapidity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. A servomotor is controlled by controlling its position using pulse width modulation technique.[16] The width of pulse put on the motor is differed and send for a set amount of time. The pulse width decides the angular arrangement of servomotor. The output shaft of this motor can be moved to a specific position. Servo motors are largely used in home electronics, toys, cars, airplanes.[16]

IV. Architectural Model :

The explanation of the architectural model is given below :

1. Here, we are working with microcontroller PIC18f25k20, input is given to microcontroller using from bluetooth module, RFID sensor and ultrasonic sensor module and output will be in the form of braille on servomotor which is a refreshable braille display.
2. Bluetooth module on a portable device is connected to mobile through bluetooth terminal HC-05 through which any braille document is transmitted and translated into braille language word by word.
3. Ultrasonic sensor detects the obstacle coming in the way of blind person, that input is given to controller to convert it into braille. A buzzer is also connected , if the obstacle is below a certain threshold level then it will buzz to indicate blind person.
4. RFID reader is used to read the RFID tag to indicate at which place the person is standing.
5. A servomotor as a refreshable braille display is used which works on command and rotates

Figure 2 : Architectural Diagram



V. Conclusion:

A practical model of “Blind assistance system using refreshable display” has been attempted to assist the blind persons in our society, so that they also get the same opportunities like normal people. Blind assistance system allows to do every task as common people can do such as reading in braille language, reading documents, walking. This device can detect the obstacle and also calculate the distance of obstacle, thus blind person can easily travel independently anywhere. Since this device is portable and economical as compared to other devices it is very beneficial for the blind person. Also, as there is no need of any paper like in the braille printer or braille embosser it is ecofriendly as well as socially oriented model.

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