ELECTRONIC DISPLAY SYSTEM FOR BOTH BLIND AND NORMAL PEOPLE

PROJECT REFERENCE NO.: 38S0737

COLLEGE : AKSHAYA INSTITUTE OF TECHNOLOGY
BRANCH : ELECTRONICS AND COMMUNICATION ENGINEERING
GUIDE : MR. PAVAN.G.S
STUDENTS : MR. MOHAMAD FARHANUDDIN FIRAQ
MR. NAVEEN M
MR. SIDDARAJU K

Keywords: Braille system, digitization, 7 segment LED display, solenoid, IR object sensor

1. Introduction

As in the earlier stages of evolution in Education for the blind people, Braille system was introduced. Here Braille is a tactile writing and reading system used by blind and visually impaired. It is traditionally written with embossed paper but when books are made out of this papers, cost of this Braille based books becomes high and size becomes bulky and also the Braille printers are highly expensive this are the major disadvantages. With advancements in technologies the audio tapes as hearing aids, electro-mechanical device for displaying Braille characters, software supported software package with utilities that give blind persons chance to use a computer as a normal user by reading with a computer-generated voice were introduced but are expensive.

This project aims at presenting a model of an electronic display system that displays Braille data for the blind and also displays the data which is visible to normal people. This system will minimize the use of paper as the display itself is a refreshable Braille display with an electronic display. Braille is the equivalent to print for readers who are blind. Some theorists have suggested computers with speech will replace the need for Braille. However, the use of computers with speech rather than Braille severely limits the user's independence in such areas as portable and efficient access to print material (e.g., labeling one's CDs, canned goods or clothing; jotting down telephone numbers). Braille skills have also been directly associated with, and will greatly enhance the employability of the individual. The present day Braille devices cost thousands of dollars and also lack the feature of displaying data for normal people whereas this model is less expensive than

present day devices and has an add-on feature of displaying data for normal people. If this system is implemented and used busy places like government offices, banks, schools, and in other notice boards, education sector, E-book readers, mobile phones, ,etc it will be very helpful for blind people as well as normal people. Blind people can easy access it. This project aims at overcoming the drawbacks of the existing solutions by integrating the Braille characters with electronic display that is the Braille characters and the display unit together. Thus, it enables the user (blind/normal) to read any book or even some notes in the digital storage drive which are in the text and Braille format on the display.

1.1 Existing Model

Market study on Existing Commercial Devices are based on Piezoelectric Actuation. Each Braille cell has a retail cost of **$30-35**. End-user products typically have 40 such cells, and cost to users $2500 –5000. Per cell cost thus comes at **$62 -125**$

Currently, the SMA-based Braille cells are being developed further for improved functionality but are expensive (**400**Rs per character), hard to implement.

Daisy Consortium's Transforming Braille Project has evaluated TacRead. It has identified as a potential solution to the global hunt for a low-cost Braille display

Existing devices lack the feature of displaying data which is visible for normal people.

However in reference [1] a prototype of Braille Book is demonstrated, which is a portable and user-friendly device that converts the large ocean of e-knowledge into the Braille format for the blind to access easily. The Braille Book makes use of USB flash drives that contain several books in text format. It has a speech recognition system using which the user can search for the file name or its author, which when selected will be displayed on a refreshable display. Furthermore, the Braille Book is equipped with the audio notifications to enable the user to navigate through the entire process easily. It is an innovative upgrade to the presently available electronic Braille display devices which are either not portable or have a PC dependency. **BUT this model uses 6 solenoids for displaying a single character whereas as our model uses only one for displaying more number of characters. Also data represented in this model is only accessible for blind whereas our model can display data for both blind and Normal people**.

Our proposed model can be regarded as least expensive compared to present day Braille devices.

2. OBJECTIVES

The titled model proposes an electronic display system capable of displaying data which can be accessed or readout by both blind & Normal people (Refers to people with enough eye sight to see and sense the data)

Outlining the main aim of our project is to develop an model electronic display system which is

- Capable of displaying data for both blind and normal.
- Portable and easier to install.
- Reliable and low cost compare to present day devices.
- Capable of giving information even in busy places were noise is an interruption

3. METHODOLOGY

This section provides the methodology of proposed system and steps involved in the system.fig 3.1 represents the architectural view and also represents the integration of an electronic display (7 segment display) and refreshable Braille dots.

The novel technology which we employ here is that the electronic display system is divided into three layers.

- The first layer consists of electronic display which represents data that can be accessible to normal people.
- The second layer consists of Braille dots which are connected to push pull solenoid which provides push-pull operation of Braille dots through which blind people can sense the data.
- The third layer consists of reflective IR object sensor, which on sensing finger touch produces logic level 1 (high).

Step 1: when the data is sent through interfaced pins of microcontroller, the electronic display (1^{st} layer) displays data which is visible to normal people.

Step 2: When the blind people touches with his/her finger at the respective Braille dot, the reflective IR object sensor gives logic level high.

Step 3: Now the status of Braille data in memory is compared with reflective IR object sensor output based on this output the push pull solenoid tends to push-pull operation of Braille dots through which blind can sense and read out the data.

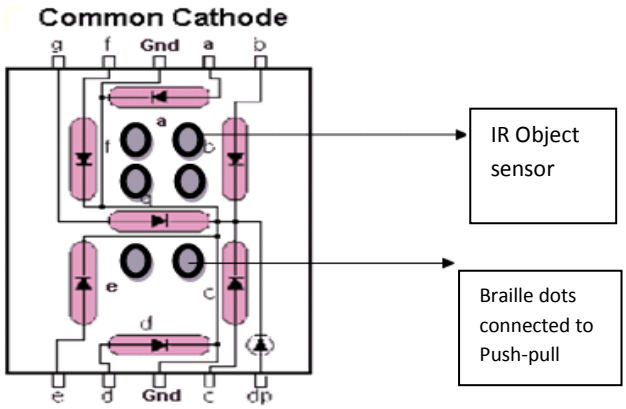


Fig 3.1: Architectural view (here a,b,c,d,e,f.g are LEDs of 7 Segment LED display.

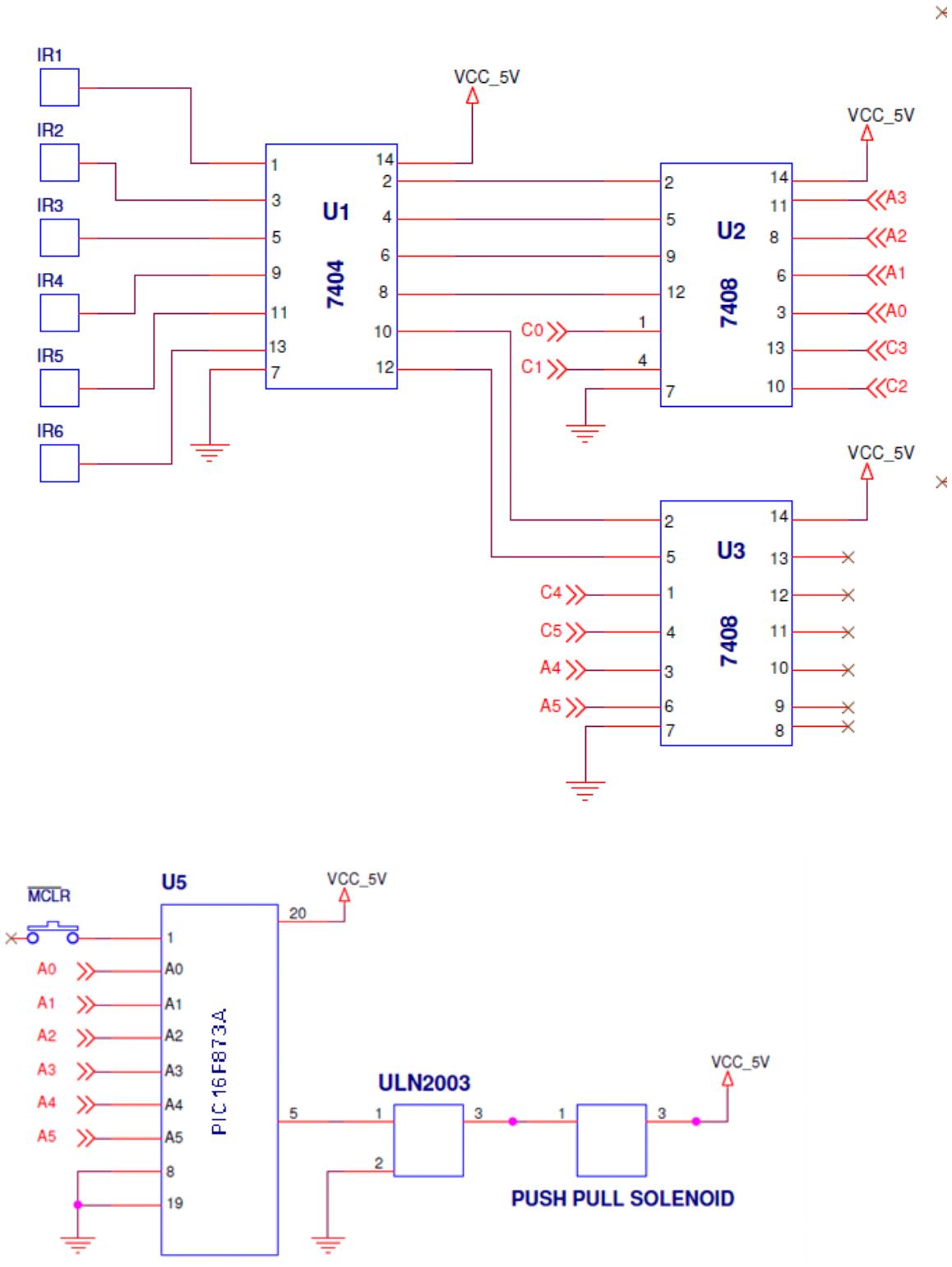
3.1 Hardware Requirements

- PIC16F877A Microcontroller.
- PIC16F873A Microcontroller
- 7 segment LED display.
- Push pulls solenoid.
- IR object sensors
- Power supply unit
- ULN 2003 Current amplifier IC
- 7404 and 7408 Basic logic gate ICs.

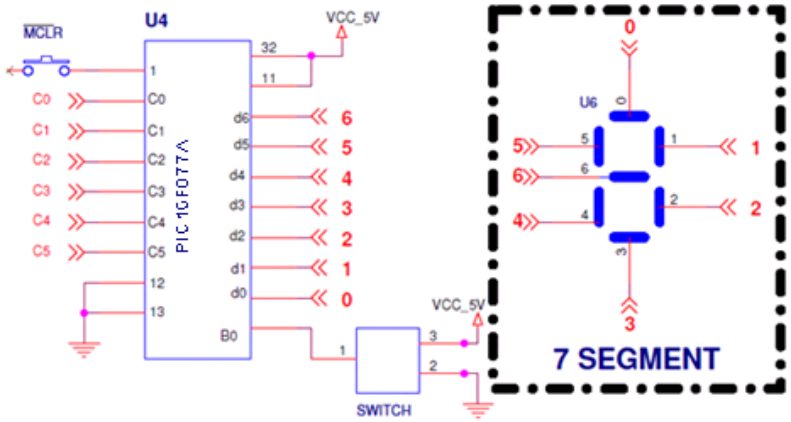
3.2 Software Requirements

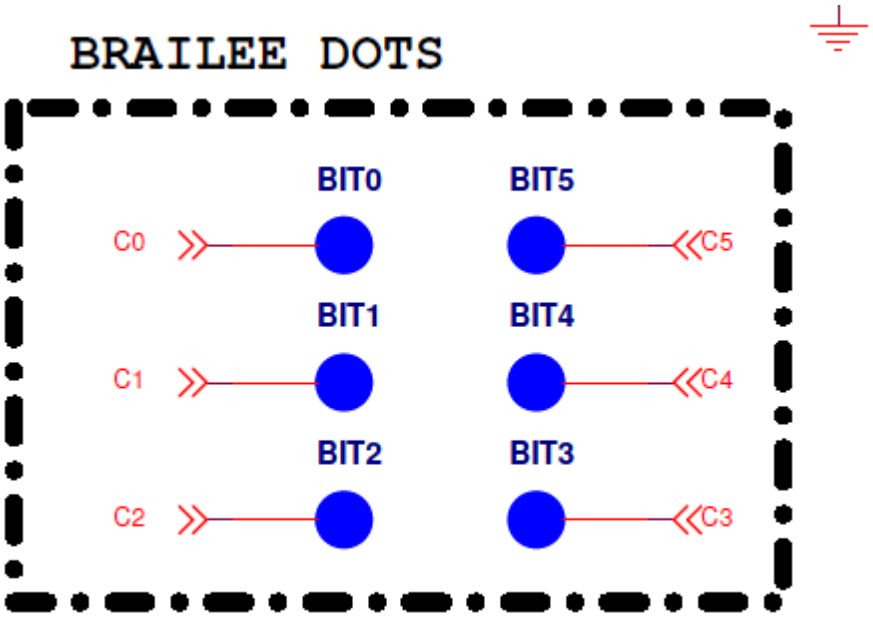
- MP Lab IDE
- Windows Xp O.S

3.3 Over All Block Diagram



3.3 Over All Block Diagram (continued)





4. RESULTS AND CONCLUSION

In this section, Conclusion of our project that is Electronic Display system for both blind and normal people is presented and also this section results by demonstration illustrations.

4.1 Results

The Electronic Display system for both blind and normal people is demonstrated by displaying data on electronic display and pulling/pushing Braille dots using a push-pull solenoid based on finger touch sensed by IR obstacle sensor. A switch is provided to change characters.

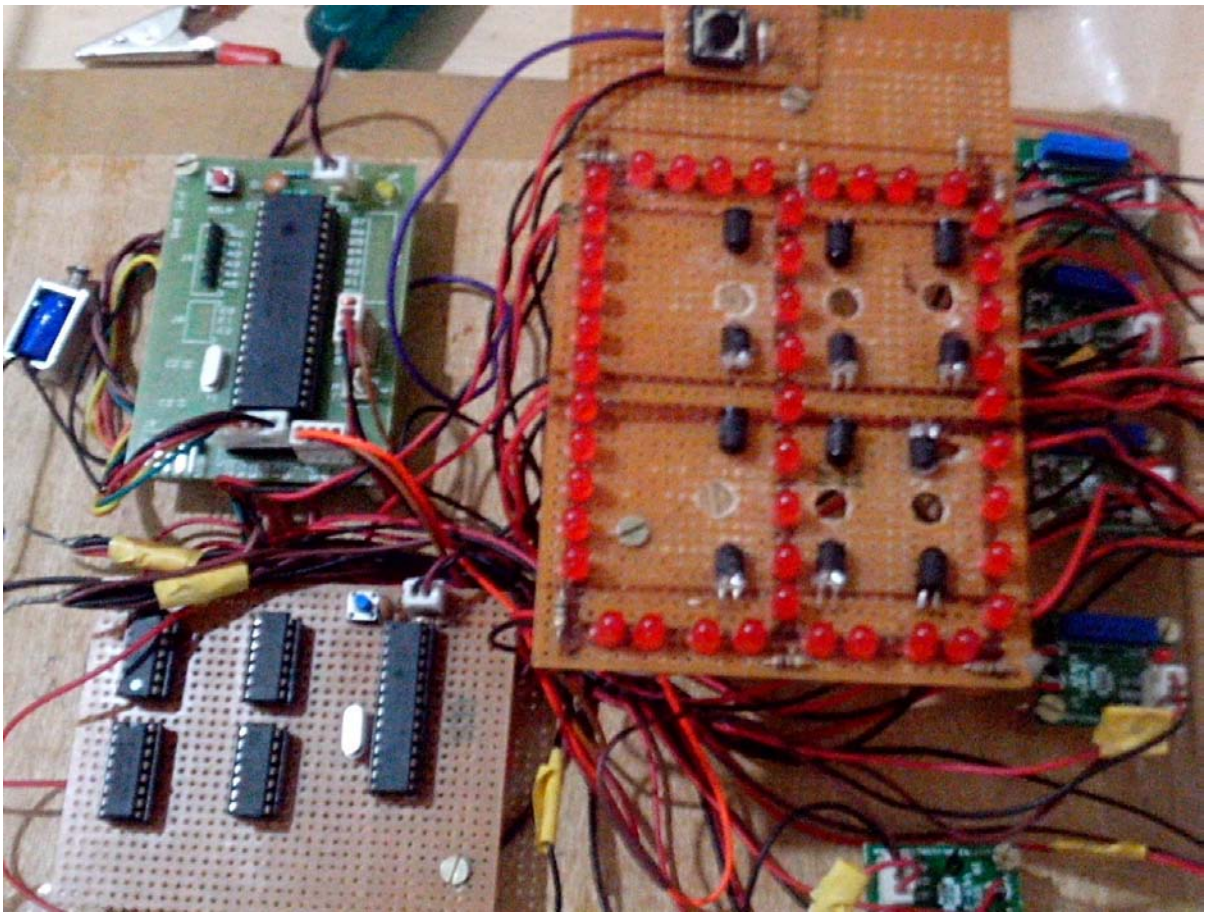


Illustration 3.4.1: Overall Embedded System

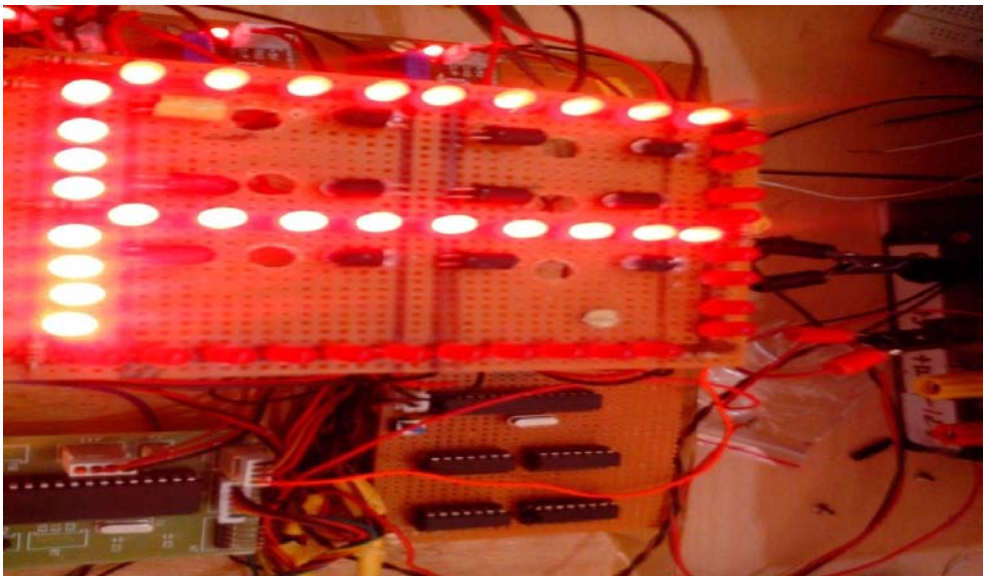


Illustration 3.4.2: The above picture describes character ‘F’ displayed on 7 segment LED display.

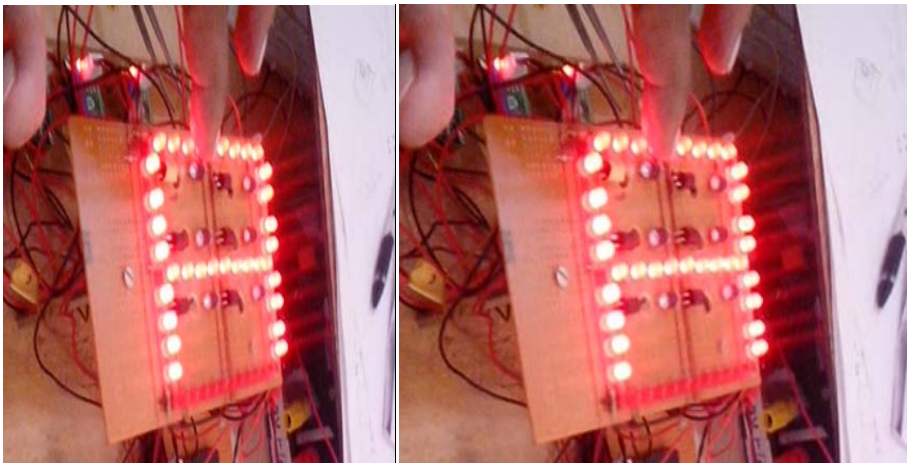


Illustration 3.4.3: here the electronic display displays character ‘A’ ,however when a user touches the first dot the solenoid which is beneath the system pushes the Braille dot through first hole. However when user touches other dots solenoid remains idle.(refer background for Braille pattern of A)

The Braille sensing for A, E, O characters is verified and displayed and also English characters and numbers are displayed.

4.2 Conclusion

Nowadays, Electronic displays are emerging everywhere as a replacement for paper and even saving a lot of paper. Today’s electronic displays are capable of only displaying data to people with proper eyesight but not blind/partially blind people., so for Electronic audio based system are available but are not immune to noise, electronic versions of Braille displays are available for blind but are expensive and can be accessed only by people who are trained in Braille system. If we consider our proposed model, we have

integrated an electronic display with a refreshable Braille display as they both are integrated as a single unit they are accessible for both blind and normal people. The novel methodology which we have employed here makes this model to be least expensive compared to present day market refreshable Braille display which cost thousands of dollars with Add-on feature of displaying data to Normal people. This means, our project is more economical, time saving, helpful to people, more efficient, easily manageable. The Electronic Display system for both blind and normal people is reliable to a maximum extent when compared to all other types of displays.

5. SCOPE OF FUTURE WORK

Here we are using the electro mechanical solenoid. In future we can extend this by use of Electronic active polymers, which are lighter and flexible. A Braille e-book is a refreshable Braille display using electro active polymers rather than mechanical pins to raise Braille dots on a display. As of 2013, they exist only in concept design; though not inherently expensive, due to the small scale of production they have not been shown to be economical. Further obstacle detection by using some advance techniques and devices like reflective IR sensor, advanced motion sensors can be used to reduce size of obstacle detection circuit. Another application of this model is it can be used as a keyboard by just remodeling the code however it remains our future work. As part of future work by using different types of Electronic displays with reduced size the model can be made lighter. Rotating-wheel Braille display was developed in 2000 by the National Institute of Standards and Technology (NIST) and another at the Leuven University in Belgium. Both wheels are still in the process of commercialization. In these units, Braille dots are put on the edge of a spinning wheel, which allows the user to read continuously with a stationary finger while the wheel spins at a selected speed. The Braille dots are set in a simple scanning-style fashion as the dots on the wheel spin past a stationary actuator that sets the Braille characters. As a result, manufacturing complexity is greatly reduced due to Novel methodology, when in actual production, should be less expensive than traditional Braille displays. Designs for a full Braille computer monitor also Remains a futuristic work.

References: [1] International Journal of Scientific and Research Publications, Volume 4, Issue 10, October 2014 1 ISSN 22503153 Braill-e-Book: An Innovative Idea for an Economical, User-Friendly and Portable eBook Reader for the Visually Impaired.