

CSP 315 Project

Mobile Braille to Text Converter

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MOTIVATION :

The task of our project is to create a product that can enable blind-deaf to use mobile phones with better ease. The goal is to develop a single, easy to understand interface for mobile devices. Our major concern is to eliminate their dependence on sight and sound, with the help of their tactile senses, so as to enable them to use their cell phones with ease.

Our project is aimed at building a Braille display unit which can reflect the contents of a mobile screen, so that it can be read and manipulated easily by the blind-deaf.

OBJECTIVES :

- To develop Braille Display Hardware Unit with Bluetooth connectivity with options for scrolling text.
- To create a Java Based Software for the mobile phone to communicate with the developed Braille Display Unit.
- If possible to provide options for message manipulation using the mobile.

APPROACH AND DESIGN:

PROPOSED BLOCK DIAGRAM :

1. Reading the SMS text file and sending data through Bluetooth:

A software is needed which can read the text messages stored in the message storage area of the cell phone . This applet will be responsible for reading the text file and sending individual characters through the Bluetooth of the cell phone.

-Our JAVA applet which configures the cell phone to work as a client/server for the Bluetooth module located on the Hardware unit.

-The applet is responsible for reading text and sending characters serially by accessing the cell phone's local Bluetooth and by identifying the remote Bluetooth devices.

-The applet is built using J2ME (device configuration- CLDC 1.1 , profile- MIDP 2.0) with the help of NOKIA Symbian 3 Software Development Kit. It can function on any mobile phone with the Symbian S60 OS.

2. Reception of the sent data through the Bluetooth module :

-A Bluetooth module is located on the hardware unit which is responsible for receiving the data sent from the cell phone.

-For this purpose , our Bluetooth module works in the RFCOMM profile (by creating a virtual port for **Serial Port Emulation**) using the UART protocol for data communication .The module works in the Slave mode .

3. Interpretation by the Microcontroller and parsing to the Braille Cell Unit:

-The data received through the Bluetooth module is accessed by the microcontroller which converts the received characters to their ASCII equivalents. These are then mapped to the Braille character set through a digital logic which is designed to parse these equivalent integers to the Braille characters.

The 6-bit mapping is used:

1. Configure the cell phone to work as a Master .
2. Identify the Bluetooth Module on the Hardware unit as a remote Bluetooth device.
3. Ask the user which SMS does he want to read.
4. Create a file stream to access the SMS text character by character.
5. Transmit the characters serially to the Bluetooth Device.
6. Finish on encountering the end of file character.
7. Exit .

For the Braille Refreshable cell

The following functionality is provided in the Braille Display Unit :

- 1) **Updatedata(data,end)** : Firstly, this function is used to store data coming through Bluetooth Module in a char array with 'end' specifying the end of the data stream.
- 2) **UpdateScroll(cursor,end)** : This function updates the cursor pointer which keeps track of the current position in the data array. The 8 characters including from cursor pointer are then sent to display function for display on the Braille Refreshable cells.
- 3) **Display(d1)** : d1 array is 8 char array which contains all the characters to be displayed on the unit . Internally functions are provided for converting the ASCII values into the equivalent 8-bit Braille digits.

STATUS:

For the Braille Display Unit:

1. The working of the braille cells was studied and the Refreshable Cell board has been successfully interfaced with the PIC microcontroller.

2. The Bluetooth module has also been configured to communicate with the microcontroller. Though the full functionality of the system as a whole has not been tested.
3. We initially started to work on an ARM board in the lab, but found it to be unfeasible later, so we shifted to the PIC platform.

For the JAVA applet :

1. An applet which configures the cell phone to function as a client-server has been developed . This applet can be used to transmit characters from the cell to any remote Bluetooth device.This applet has been tested in a Nokia S60 emulator.
2. Currently , we are working on how to access the stored SMS.

FUTURE PLANS :

In the next 5 weeks, we plan to do the following:

1. Complete assembly and testing of the Braille Display Unit. And go for better designed and optimized hardware.
2. Memory access methods in the cell phone need to be developed . Also because of the limited memory size of the PIC, a method for reading long SMS's (messages larger than the buffer size of the PIC) would be developed.
3. We would also try to add a software application that would help the user write his messages by simultaneously displaying the typed character on the Braille cells.

