Sparsh-A Reconfigurable Touch Screen Keyboard

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ABSTRACT
Traditional QWERTY keyboards provide a minimal but functional interface. However these keyboards are bulky and offer very little in terms of enhancements. In this age of miniaturization, where the size of laptops and desktops is becoming smaller, the traditional keyboard acts as a hindrance to further miniaturization. The Reconfigurable Touch-Screen Keyboard (RTSK), with its minimal physical form can provide a solution to this problem. It is a user-friendly touch-screen keyboard that can change its layout with every application and has multilingual font support. In addition to the conventional keys our study also comprises of designer keys which are easily identifiable by the user.

General Term
The project is based on Embedded Systems.

Keywords
Reconfigurable,Keypress,Touchscreen,Refreshing,Interfacing.

1. INTRODUCTION
The most important feature of the RTSK is its reconfigurable nature. The software and driver that shall be written to drive this keyboard will allow the user to design and create their own custom keyboard layouts and save them or even share them with other users. This way a user can set his own layout that best fits him ergonomically [1][2].

The RTSK uses a high resolution graphics LCD to display the current layout of a keyboard. Hence apart from just text characters it can display icons that can represent the action of the key more specifically. E.g. while playing the game, the keyboard shall display all the icons relevant to that game and while operating an image processing software the keyboard will change all it's key icons to show the operation represented by each key such as gun image for shooting operation. Also, the operations which require more than one keypress can be merged into a single keypress. E.g. ctrl+c i.e. copy can be replaced by a single button named as 'cpy'.

It uses a touch screen sensor placed on the top of the graphics LCD sense touch. The RTSK uses serial port interface to connect to a PC. It can also be used in synchronization with the existing conventional keyboards[6].

2. RELATED STUDIES
Virtual Pen Keyboard

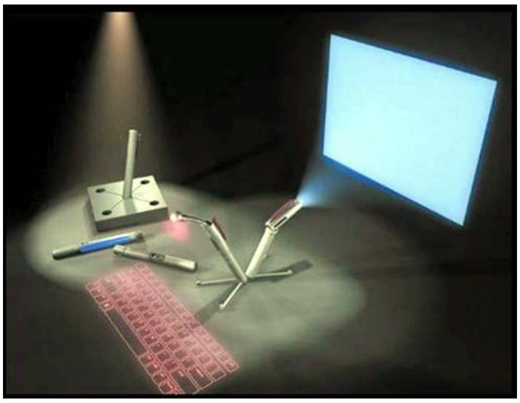

Fig 1: Virtual Pen Keyboard

These pen-like components work together to produce both the monitor as well as the keyboard on any flat surfaces-- where you can carry out functions you would normally perform on your desktop computer as shown in Fig. 1.[5]

It requires extra hardware and lasers and 3D Ranging Cameras which is costly and can't be used with red background and is Non Adaptable. This technology has emerged from Image processing.

3. OPTIMUS MAXIMUS KEYBOARD
This keyboard comprises of keys having LCD screens embedded in each button as shown in Fig. 2.[4]

Fig 2: Optimus Maximus Keyboard

Each key is a stand-alone display that shows the function currently assigned to it. Optimus's customizable layout allows convenient use of any language—Cyrillic, Ancient Greek, Georgian, Arabic, Quenya, hiragana, etc.—as well as of any other character set: notes, numerals, special symbols, HTML codes, math functions and so on to infinity.LCD in every key makes it worth 60000 Rs/- and it is not virtual and not resizable.

4. IMPLEMENTATION

Fig. 3 depicts the working of Reconfigurable touch-screen keyboard which comprises of designing of the Graphical User Interface and the algorithms used are Refreshing and Interfacing.

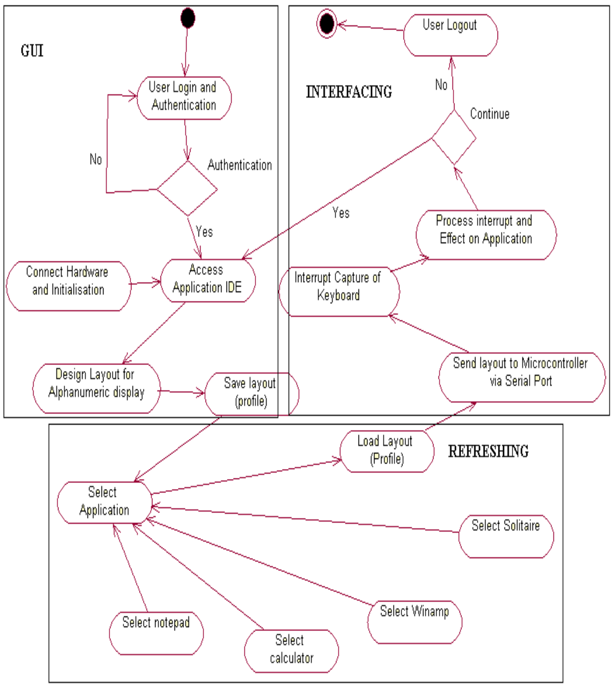

Fig 3: Working

4.1 Graphical user interface

GUI enables the user to draw his own designer keys. These keys are scalable and can be of various fonts, languages, pictures, etc. which extends the existing database of keys[3].

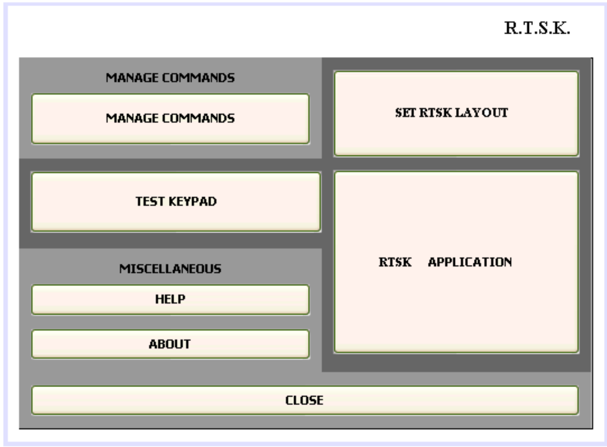

Fig 4: GUI

4.2 Refreshing algorithm

When we open a new application, that application's keypad layout will be fetched from the database and will be newly displayed on the Touch screen Keyboard. For example: If the user is using a word application, with its respective keyboard layout and wants to open a gaming application, then the layout of word application will get replaced by the layout of gaming application.

4.3 Interfacing algorithm

When the user opens the application, the software reads the application keypad layout. Then that keypad layout is sent to the microcontroller via Serial Port. The microcontroller checks the status of the key and sends the index to the computer if 'TRUE'.

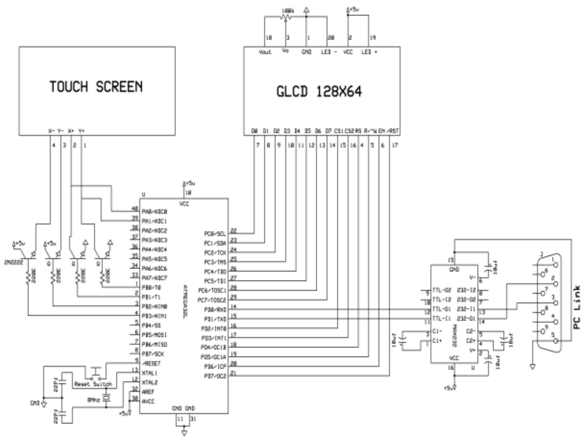

Fig 5: Architecture

The components used in RTSK are:

- Microcontroller ATmega 32L.
- MAX 232 for voltage level conversions.
- GLCD for display.
- Touchscreen.

5. CONCLUSION

This paper proposes a method to design a user friendly keyboard which is dynamic in nature and covers most of the shortcomings present in the existing keyboards.

This keyboard is scalable i.e. size of the keys as well as the keyboard is variable, which makes it cost effective. It is easy to handle and portable because of its small size.

The technique used in RTSK is platform independent thus making it convenient for the user to use it in any environment.

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