Customizable Keyboard

Eric S. Missimer, Samuel Epstein, John J. Magee, and Margrit Betke

Department of Computer Science
Boston University, Boston, MA, USA
{ missimer, samepst, mageejo, betke } @cs.bu.edu

ABSTRACT

Customizable Keyboard is an on-screen keyboard designed to be flexible and expandable. Instead of giving the user a keyboard layout Customizable Keyboard allows the user to create a layout that is accommodating to the user's needs. Customizable Keyboard also allows the user to select from a variety of ways to interact with the keyboard including but not limited to using the mouse pointer to select keys and different types of scan based systems. Customizable Keyboard provides more functionality than a typical onscreen keyboard including the ability to control infrared devices such as TVs and send Twitter® Tweets.

Categories and Subject Descriptors

H.4.3 [**Communications Applications**]: Miscellaneous; H.1.2 [**User/Machine Systems**]: Human information processing

General Terms

Human Factors

1. INTRODUCTION

Customizable Keyboard is an on-screen keyboard designed to have a flexible key layout and be provide functionality beyond a standard on-screen keyboard. Typical on-screen keyboards either use a QWERTY keyboard layout such as the on-screen keyboard that is included with the Windows operating system or have a fixed button layout with large buttons and space in between each button such as Midas Touch [2]. Customizable Keyboard allows the user to create his or her own layout so the program can conform to the needs and preferences of the user, instead of the user becoming accustomed to the program. Customizable Keyboard was developed for and tested with Camera Mouse [1], an assistive mouse-replacement technology that allows users to control the mouse pointer with head gestures. It can also be used with any other computer-mouse or binary-switch system.

2. FLEXIBLE KEYBOARD LAYOUT

Before operating Customizable Keyboard, the user designs a keyboard layout or loads a previously saved keyboard layout. To create a keyboard layout, the user or a caregiver positions buttons in a window of Customizable Keyboard. Customizable Keyboard includes multiple windows, so the user can arrange the on-screen keyboard to occupy separate sections of the computer screen. Buttons can be arranged with an interface similar to arranging windows in operating systems such as Windows; selecting and dragging an edge allows the edge to be extended and selecting the button closer to the middle allows the button to be moved.

A layout can also be hierarchical, allowing the user to add multiple buttons within a group button. When the group button is selected, the user is presented with the buttons within that group. Once a desired layout has been created, it can be saved for later use and the user or caregiver can turn the program's editing mode off so it operates as an on-screen keyboard. While the program is out of editing mode the button window layout of the program cannot be changed to avoid accidental changes when the program is in use.

3. KEYBOARD MODES

To extend the flexibility of Customizable Keyboard further, the program allows the user to select from a variety of keyboard modes.

One example mode allows the user to activate a button by clicking within the button. Another is a scan-based selection system where buttons are sequentially highlighted and the highlighted button is activated when the user performs a left click either with a mouse or a binary switch. Keyboard modes are loaded at runtime dynamically to allow faster development and easier deployment of different keyboard modes.

4. CHARACTER BUFFER

In addition to providing input to other programs, Customizable Keyboard also has a window to display the entered text, the character buffer. The user can type text into the buffer and activate buttons that perform actions on the text. For example, Customizable Keyboard currently allows the contents of the character buffer to either be spoken with a text-to-speech module, pasted into another program, or sent as Twitter® tweets (see Fig. 1).

5. BUTTONS

Customizable Keyboard provides features to the user with buttons. There are buttons for the traditional keyboard keys, where each button corresponds to a single key. However, buttons are not limited to the actions of a traditional

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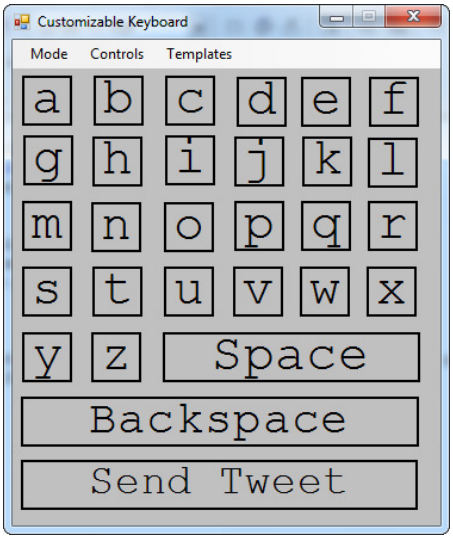

Figure 1: Customizable Keyboard with alphabet layout and tweet button

keyboard. The program currently supports buttons that type and/or speak a preset word or phrase and buttons that allow users to transmit infrared signals to control devices such as a TV using a USB infrared transmitter. Button types are also loaded dynamically. The following buttons are supported:

- **Key Buttons** - Key buttons correspond to traditional keyboard keys. These includes alphanumeric characters, punctuation, the space bar and backspace.

- **Group Buttons** - Group buttons allow for a hierarchical keyboard layout. A group button represents a pre-set group of buttons. When the group button is selected, its window changes to display the buttons contained in the group. This allows for keyboard layouts to have a smaller number of buttons at any time.

- **Macro Buttons** - Macro buttons allow a user to perform a common task in a single click. The button can automatically enter a string of text, read a given string aloud or play a .wav file. Either of the sound options can also be combined with the text-entering command into a single macro button.

- **Infrared Buttons** - By connecting a Tira USB Infrared Receiver/Transmitter [3] infrared buttons can be programmed to mimic an infrared transmission such as one produced by a TV remote. Infrared buttons can then be triggered to cause the infrared transmitter to send the previously saved infrared transmission.

- **Twitter Button** - The twitter button allows a user to send the contents of Customizable Keyboard's character buffer as a Twitter® tweet.

- **Character Buffer Buttons** - Character buffer buttons can cause the contents of the character buffer to be spoken with a text-to-speech module and/or pasted into another program.

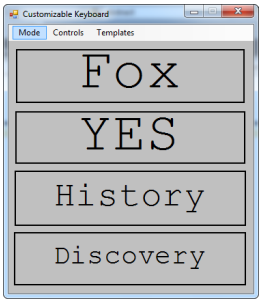

Figure 2: Customizable Keyboard with layout that enables selection of four TV channels

- **Shortcut Buttons** - Program shortcut buttons can be linked to an executable. When the button is activated, Customizable Keyboard starts the linked program.

- **Internet Bookmark Buttons** - Internet bookmark buttons enable the user to open the default Internet browser to a specific website.

- **Template Selection Buttons** - Template selection buttons enable the user to switch between different keyboard layouts while the keyboard is being used.

6. EXPERIENCE WITH USER WITH QUADRIPLEGIA

For a user whose voluntary movements are restricted to his eye lids and eye brows, the keyboard layout shown in Figure 2 was developed. It enabled the user to switch between four different TV channels.

7. FUTURE WORK

Future work for Customizable Keyboard includes adding buttons that send AOL® instant messages and emails. Word prediction and correction for the character buffer will also be considered.

Using different keyboard modes, Customizable Keyboard will also be extended with a module that analyzes the user's communication rate and accuracy to dynamically determine the time parameters for a scan-based system [4].

8. ACKNOWLEDGMENTS

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