Int. Journal of Engineering Research and Applications www.ijera.com
ISSN : 2248-9622, Vol. 4, Issue 4(Version 4), April 2014, pp.129-130

RESEARCH ARTICLE OPEN ACCESS

Virtual Keyboard Using Image Processing

ABSTRACT
As the technology advances, more and more systems are introduced which will look after the users comfort. Few years before hard switches were used as keys. Traditional QWERTY keyboards are bulky and offer very little in terms of enhancements. Now-a-days soft touch keypads are much popular in the market. These keypads give an elegant look and a better feel.
Currently keyboards are static and their interactivity and usability would increase if they were made dynamic and adaptable. Various on-screen virtual keyboards are available but it is difficult to accommodate full sized keyboard on the screen as it creates hindrance to see the documents being typed. Virtual Keyboard has no physical appearance. Although other forms of Virtual Keyboards exist; they provide solutions using specialized devices such as 3D cameras.
Due to this, a practical implementation of such keyboards is not feasible. The Virtual Keyboard that we propose uses only a standard web camera, with no additional hardware. Thus we see that the new technology always has more Benefits and is more user-friendly.
General Terms : Virtual Keyboard, Pattern matching, Pattern Recognition, Segmentation, Thresholding.
Keywords RGB, HSV, API,VK

I. INTRODUCTION

As the demand for computing environment evolves, new human-computer interfaces have been implemented to provide multiform interactions between users and machines. Nevertheless, the basis for most human-to-computer interactions remains the binomial keyboard/mouse. We are presenting here a next generation technology, which is the Virtual Keypad. As the name suggests the virtual keypad has no physical appearance. Virtual keyboard is an application which virtualizes hardware keyboard with different layouts hence allowing user to change the layout based on application. E.g. user can select different language for editor or select a specialized layout for gaming applications. User can even design his own layout in hardware version. .

II. Related Work

The Virtual Keyboard has been implemented in a number of different forms, as described by Adajania, Gosalia, Kanade, H. Mehta, Prof. N. Shekokar ,Kölsch, M. and Turk, M of these, the ones based on 3-D optical ranging and CCD cameras are most significant as they are based primarily on image processing. The elaborate research done by Kölsch, M. and Turk, highlights a variety of virtual keyboards in different forms, such as gloves, rings, hand gestures based and projection based devices. In , a special 3-D camera, or two 2-D cameras are used. Additionally a pattern projector is used for projecting the keyboard. The VK designed in makes use of a single CCD camera. Even more significant is the work presented in, where a shadow based analysis is used to acquire depth information from a 2-D image. We use the novel technique of using image processing using a web camera.

III. Proposed Solution

The proposed system would have an application front end which would help initialize the keyboard to the new environment. Any image projected/surface can be a reference and a photo of the same is stored in memory as a reference image. This reference image would be segmented using thresholding technique. On running the program we would be able to detect any change in this image by comparing it with the original image stored. After detection of the segment where the change occurs, a virtual key press would be initiated. The current function of each key would be displayed for user convenience and can be changed according to user preference.

4.1 Video Input
A constant video feed is obtained from the webcam connected to the PC. A webcam interface control / API is used for this.

4.2 Frame Grab
At regular intervals (about 10 to 15 times every second), the current frame from video is copied as image to some other image control where in we can read or manipulate pixels from that image.

4.3 Pre-Processing
An image processing filter is applied the input image to improve it for further processing. Here we either blur the image in case it's too sharp. Else we sharpen

the image in case the video feed is too blurred. Hence either sharpening or
Gaussian blur filter is used based on quality of feed..

4.4 Selective RGB
The image pixels are filtered based on their color components (R, G and B values). The threshold ranges for these colors are specified by used initially. The ranges have to be specified based on the color of the symbols.

4.5 RGB to HSV Conversion
HSV model stands Hue, Value, and Saturation. Hue represents color type. It can be described in term of angle on the above circle. Saturation represents vibrancy of color. Value represents brightness of color.

4.6 Histogram
A binary histogram for individual characters is constructed. Histogram is the frequency count for the pixels (which will be either completely black or completely white after Thresholding).

4.7 Pattern Matching and Pattern Recognition A number of steps are applied to match the pattern being stored and recognize the exact pattern with the input given by user.

4.8 Output keystrokes
Using the Robot API, the output keystroke is analyzed.

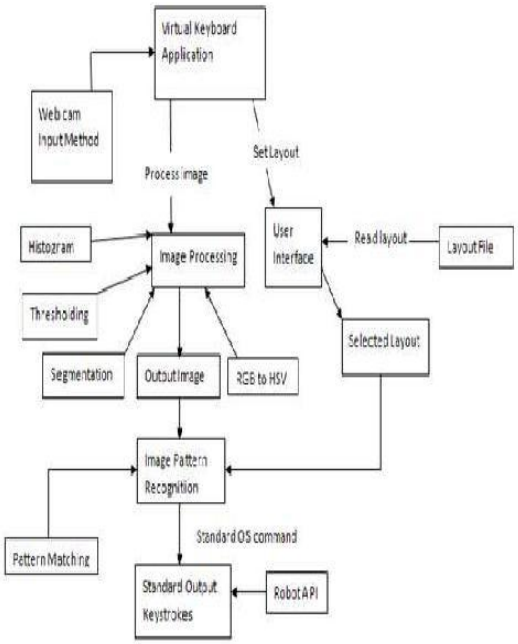

Fig 1: This explains the system architecture of our Virtual Keyboard. It explains the overall working of the application.

IV. Future Work

The true application of this idea would be in developing virtual keyboards for mobile devices, which would enable us to use a full sized QWERTY keyboard without the need for additional physical space or hardware. Moreover, the VK can find applications in gaming, 3d modeling etc In a country like India, which has a rich repository of languages, a Virtual Keyboard can be used to generate multilingual keyboards, by just changing the internal mapping of characters, with no change in hardware. This can make multilingual keyboards economically feasible. Finally, such a keyboard creates the possibility of developing specialized keyboards especially for the blind, without additional expenditure.

V. Conclusion

This paper presents a practical implementation of a Virtual Keyboard and demonstrates the future of human computer and human-mobile devices interaction lies in the creation of Virtual Human Interface Devices

REFERENCES

[1] Y. Adajania, J. Gosalia, A. Kanade, H. Mehta, Prof. N. Shekokar, "Virtual Keyboard Using Shadow Analysis",Third International Conference on Emerging Trends in Engineering and Technology, 2010
[2] Kölsch, M. and Turk, M. "Keyboards without Keyboards: Survey of Virtual Keyboards", Workshop on Sensing and for Media-centric Systems, Santa Barbara, CA, June 20-21, 2002.
[3] H. Du, T. Oggier, F. Lustenberger and E. Charbon, "A virtual keyboard based on true-3D optical ranging," Proc. British Machine Vision Conference (BMVC), Oxford, pp. 220-229, Sept. 2005.
[4] Matsui, N. & Yamamoto, Y. A New Input Method of Computers with One CCD Camera: Virtual Keyboard. Keio University, 2000.
[5] Wijewantha N. S.," Vista Key: A Keyboard Without A Keyboard – A Type Of Virtual Keyboard," Final year project hesis, Informatics Institute of Technology, Wellawatta, Sri Lanka, April 2004.