VIRTUAL LASER KEYBOARD

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ABSTRACT

Now a Days computing is not constraint to desktops and laptops, it has got its way into mobile devices like mobile phones. But the input device for the computing process has not been modified from the last few years. eg:-QWERTY keyboard. Virtual Keyboard allows users to work on any surfaces by using sensor technology if it is a input device. Virtual Devices have developed a flashlight-size gadget that projects an image of a keyboard on any surface and let's people input data by typing on the image. The Virtual Keyboard uses light to project a full-sized computer keyboard onto almost any surface, and disappears when not in use. Used with Smartphone and PDAs, the keyboard provides a practical way to do email, word processing and spreadsheet tasks, allowing the user to leave the laptop computer at home.

Keywords: Sensors, Template Projection, Illumination, Interpretation, Communication

I. INTRODUCTION

Virtual keyboard is just another example of today's computer trend of 'smaller and faster'. Computing is now not limited to desktops and laptops, it has found way into mobile device also. But what is not changed is the input device, the good old QWERTY keyboard. The virtual keyboard technology is a tabletop unit that projects a laser image of a keyboard on any flat surface. They are not the electronic device they are just the set of lights that look likes the keyboard and works like a keyboard. In this technique we use a device that produces the LASER light on the flat surface. This LASER light produced is the keyboard. It creates detectable surface on which user don't need to press the key like normal keyboard, when a user touches the surface covered by an image of a key, the device records the corresponding keystroke.

II. SYSTEM ARCHITECTURE

Figure 2 shows the physical setup of the system. The 3D range camera is placed several centimeters over the input surface, with a well-defined angle facing the working area. The proposed system consists of three main hardware modules. The display projector is mounted on the camera, facing the same area, which would generate the visual feedback for the keyboard and input information.

2.1 Sensor module

The sensor module serves a eye of keyboard perception technology. The sensor module operates but locating user's fingers in 3-D space and tracking the intended keystrokes. Keystroke information is processed and can

then be output to host device via a USB or Bluetooth.

2.2 IR Source (illumination module)

The infrared light source emits a beam of infrared light. This light beam is designed to overlap the area on which the keyboard pattern projector. This is done so as illuminate the user's fingers by infra-red light beam. This helps in recognizing the hand movements and pressing of keys. The light beam facilitates in scanning the image. Accordingly information is passed on sensor module which decodes information.

Fig 2: Sensor Module

2.3 Pattern projector

The pattern projector presents the image of keyboard. Thus image can be projected on any flat surfaces. This projected image is that of standard QWERTY keyboard, with all the keys and control functions as in the keyboard. The projector features a wide-angle lens so that large pattern can be projected from relatively low elevations. In some type of virtual keyboard, a second infra-red beam is not necessary. Here the projector itself takes the input, providing dual functionally. A sensor or camera in projector picks up finger movements, and passes the information on sensor modules. A virtual keyboard system based on a true-3D optical range camera is presented. Keystroke events are accurately tracked independently on the user. No training is required by the system that automatically adapts itself to the background conditions when turned on. No specific hardware must be worn and in principle no dedicated goggles are necessary to view the keyboard since it is projected onto an arbitrary surface by optical means. The feedback text and/or graphics may be integrated with such projector, thus enabling truly virtual working area. Experiments have shown the suitability of the approach which achieves high accuracy and speed. People with bigger fingers may find the keyboards on smart phones and PDAs too small. To make up for this, some manufactures have developed special virtual laser keyboards to accompany handheld devices.
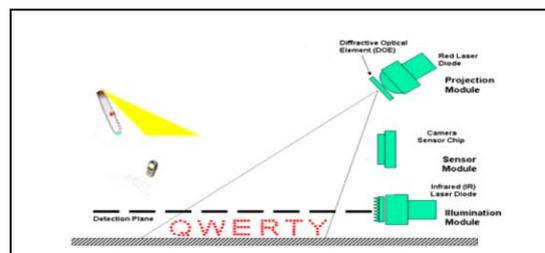

Fig 2: Physical setup of system [4]

III. WORKING OF VIRTUAL LASER KEYBOARD

3.1 Template projection

A template produced by a specially designed and highly efficient projection element with a red diode laser is projected onto the adjacent interface surface. The template is not however involved in the detection process and it is only used as a reference for the user. In a fixed environment, the template can just as easily be printed onto the interface surface. Figure 2 shows projection of template (keyboard).Various types of projection elements are available in market.

3.2 Reference plane illuminations

An infra-red plane of light is generated on the interface surface. The plane is however situated just above and parallel to the surface. The light is invisible to the user and hovers a few millimetres above the surface. When a key position is touched on the surface interface, the light is reflected from the infra-red plane in the vicinity of the key and directed towards the sensor module.
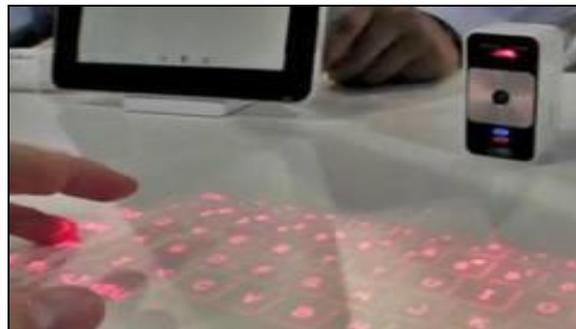

Fig 3 : A model representing virtual Laser Keyboard [5]

3.3 Map reflection coordinates

The reflected light user interactions with the interface surface is passed through an infra-red filter and imaged on to an image sensor in the sensor module. The sensor chip has a custom hardware embedded such as the Virtual Interface Processing Core and it is capable of making a real time determination of the location from where the light was reflected.

3.4 Interpretation and communication

The sensor module receives the positional information corresponding to the light flashes from the sensor processing core, interprets the events and then communicates them through the appropriate interface to external devices. By events it is understood any key stroke, mouse or touchpad control. Most projection keyboards use a red diode laser as a light source and may project a full size QWERTY keyboard. The projected keyboard size is usually 295 mm x 95 mm and it is projected at a distance of 60 mm from the virtual keyboard unit. The projection keyboard detects up to 400 characters per minute.

3.5 Image Processing with MATLAB

Images are everywhere, from everyday devices like cameras and smart phones to specialized devices for medical imaging, automotive safety, industrial automation, and more. Each of these uses for image processing has unique challenges. MATLAB and Image Processing Toolbox provide a flexible environment to explore

design ideas and create unique solutions for imaging systems. Matlab toolbox used in our project are as follows

1. Image acquisition Toolbox.
2. Image processing toolbox
3. GUI build.

IV. ALGORITHM

1.ycbcr2rgb - to convert ycbcr image into rgb.

2.color based thresholding.

3.Find the logarithmic values of color.

4.Blob detection algorithm - to detect rgb color blob (stickers).

5.Divide keyboard image into a sector.

6.Positioning the stickers with sectors.

7.Identifying the word of sector.

8.Display the output on command window

V. APPLICATION

The device can function in many ways ranging from its use in Smart phone, PDAs, e-mails, word processing, and spread sheet task. Also it is equally beneficial in Gaming control application. It is also useful in High-tech industrial sectors[5]

VI. CONCLUSION

A virtual key boards claim to provide the convenience of compactness with the advantages of a QWERTY keyboard. It is a system based on 3-D camera. Thus virtual keyboards will make typing easier, faster, and almost a pleasure.

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