

# Paper Keyboard Using Image Processing

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## Abstract

To develop associate Application to visualize the key board of laptop with the conception of image process. The virtual keyboard should be accessible and functioning. The keyboard should offer input to laptop. With the assistance of camera image of keyboard are fetched. The writing are captured by camera, as we tend to sort on cardboard merely drawn on paper. Camera can capture finger movement whereas writing. Therefore essentially this is often giving the virtual keyboard as the technology advances, additional and additional systems are introduced which can take care of the users comfort. Few years before onerous switches were used as keys. Ancient QWERTY keyboards are large and provide little or no in terms of enhancements. Now-a-days victim keypads are a lot of standard within the market. These keypads offer a chic look and a higher feel. Presently keyboards are static and their interactivity and usefulness would increase if they were created dynamic and all-mains. Numerous on-screen virtual keyboards are accessible however it's troublesome to accommodate full sized keyboard on the screen because it creates hindrance to examine the documents being typewritten. Virtual Keyboard has no physical look. Though alternative sorts of Virtual Keyboards exist; they supply solutions mistreatment specialized devices like 3D cameras. Owing to this, a sensible implementation of such keyboards isn't possible. The Virtual Keyboard that we tend to propose uses solely a regular internet camera, with no extra hardware. Therefore we tend to see that the new technology continuously has additional advantages and is additional easy.

**KEYWORDS:** - Virtual Keyboard, Image Processing, Range Camera, Edge Detection, Blob Analysis.

## 1. INTRODUCTION

As the demand for computing setting evolves, new human-computer interfaces are enforced to supply multiform interactions between users and machines. all the same, the premise for many human-to-computer interactions remains the binomial keyboard/mouse. we tend to area unit presenting here a next generation technology, that is that the Virtual computer keyboard. because the name suggests the virtual computer keyboard has no physical look. Virtual keyboard is AN application that virtualizes hardware keyboard with completely different layouts therefore permitting user to vary the layout supported application. E.g. user will choose completely different language for editor or choose a specialized layout for gambling applications. User will even style his own layout in hardware version.

Human-computer interaction (HCI) could be a discipline involved with the look, analysis and implementation of interactive computing systems for human use and with the study of major phenomena close them. In these interaction, the

data input device as interaction method has been replace to a non-physical, unknown device. Keyboard is AN data input device that has been used since the start of engineering. Its ability to precise character with an excellent speed and accuracy makes this data input device has consistent and stable usage. Keyboard encompasses a long development history that consists of the port connexion modification, size modification, and a few of it's the modification within the input media. to comprehend a replacement revolutionary method in interaction, the most plan is by victimization digital camera as an inexpensive and simply obtained input media. By victimization digital camera as media, it's attainable to act with laptop while not a true physical-interaction device. digital camera media has several benefits like the existence of the many graphics process algorithmic program that may facilitate computation. The digital camera is additionally a really common device, creating the event for digital camera will progress greatly, as folks will simply attempt to continue the event simply. the most issues in digital camera virtual keyboard is however the digital camera are going to be used, and also the algorithmic program accustomed rework the writing gesture to a keyboard input whereas still maintaining the comfort that may be found within the physical keyboard. digital camera is AN applicable media for virtual keyboard even in its limitation with the assistance of quick image process methodology. In our implementation, we tend to use a Logitech digital camera and a sheet of paper with the keyboard written on that. the sole distinctive facet of the keyboard is that it's four coloured endpoints that area unit accustomed establish the keyboard. The implementation is predicated on use of image process. the target of this paper is to develop a Virtual Keyboard (VK), victimization shadow analysis. Ancient QWERTY keyboards offer a lowest however purposeful interface. but these keyboards area unit large and provide little in terms of enhancements. during this age of shrinking, wherever the scale of laptops and desktops is changing into smaller, the standard keyboard troublesome to more shrinking. Our planned Virtual Keyboard (VK), with its lowest physical type will offer an answer to the current downside.

## 2. RELATED WORK

The Virtual Keyboard has been implemented during a variety of various forms, as delineated by Adajania, Gosalia, Kanade, H. Mehta, Prof. N. Shekocar ,Kölsch, M. and Turk, M of these, those supported three-D optical loco mote and CCD cameras square measure most vital as they're based mostly totally on image process. The flowery analysis done by Kölsch, M. and Turk, highlights a range of virtual keyboards in several forms, like gloves, rings, hand gestures based mostly primarily based mostly and projection based devices. In, a special three-D camera, or 2 2-D cameras square measure used. to boot a pattern projector is employed for projecting the keyboard. The VK designed in makes use of one CCD

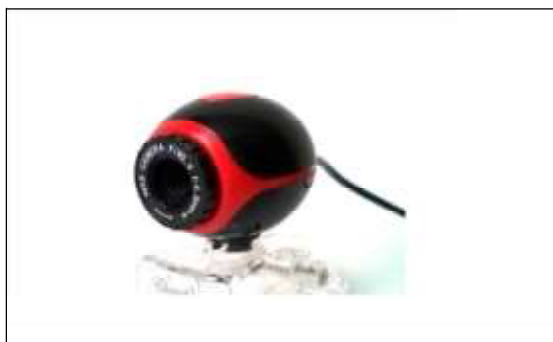
camera. Even additional vital is that the work bestowed in, wherever a shadow based analysis is employed to acquire depth info from a 2-D image. we have a tendency to use the novel technique of using image process employing a net camera.

### 3. PROPOSED WORK

The proposed system would have an application forepart which might help initialize the keyboard to the new setting. Any image projected/surface is often a reference and a photograph of a similar is hold on in memory as a reference image. This reference image would be divided victimization thresholding technique. On running the program we might be ready to discover any amendment during this image by examination it with the initial image hold on. once detection of the section wherever the amendment happens, a virtual key press would be initiated. the present operate of every key would be displayed for user convenience and might be modified per user preference.

#### 3.1 Video Input

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



**Fig 1 : Video Input**

Hardware	Specification
Interface	USB 2.0
Drive	Free, plug and play
Automation	Color compensation, White balance, Exposure
Frame Rate	VGA: 30 f/s, CIF:15 f/s
Focus Range	5cm - infinity
Image Format	BMP/JPG
Video Format	AVI
Max Resolution	1280*1024 pixels

Colour Depth	24 bit RGB
Interpolated Resolution	3 Mega Pixel
Dynamic Range	>72 Db(30F/s,220LUX)
Power Dissipation	<0.7W
Working Temperature	-10-75°C
Hi-resolving power	640*480/ 320*240

#### 3.2 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 wherein we can read or manipulate pixels from that image.

#### 3.3 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.

#### 3.4 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.

#### 3.5 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.

#### 3.6 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).

#### 3.7 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.

#### 3.8 Output keystrokes

Using the Robot API, the output keystroke is analyzed.

### 4. PROPOSED ALGORITHMS

### A. Detection of Keyboard-

The endpoints of the VK are identified using color differentiation. The endpoints of the keyboard are colored blue, thus on thresholding, these points can be easily identified. The area of interest i.e. the location of the VK in the image is then defined.

### B. Detection of Hand-

Initially, a large collection of hand pictures was created. These pictures were determined for his or her RGB (Red inexperienced Blue) values within the space of interest, i.e. the hand. It absolutely was noted that, in these hand regions the red part was above the opposite 2 parts. These observations were consistent across all the pictures that were tested. There are also bound regions on the hand like the fingernails and/or veins wherever this observation may not be true. However, this doesn't have an effect on the general result as a major portion of the hand follows the expected pattern and also the hand is befittingly detected. So as to get rid of the abnormalities within the hand regions, we tend to use image improvement techniques. Finally, the detected hand regions square measure threshold to white, whereas the remainder of the image is formed black.

### D. Detection of Edge-

For edge detection we have a tendency to use the Sobel technique that is found to offer higher results compared to the clever, Prewitt and Zero-Cross. Edge observation of the hand is needed so as to detect the fingertips. The sting obtained is then thickened so as to get rid of discontinuities [9]. This allows an entire traversal of the hand edge that is delineate within the next step. Edges characterize boundaries and are thus a haul of elementary importance in image process. Edges in pictures are areas with sturdy intensity contrasts a jump in intensity from one component to subsequent. Edge police work a picture considerably reduces the number data and filters out useless information, whereas conserving the vital structural properties in a picture. There are some ways to perform edge detection. However, the bulk of various strategies could also be classified into 2 classes, gradient and Laplacian. The gradient technique detects the sides by longing for the utmost and minimum within the differential of the image. The Laplacian technique searches for zero crossings within the second by-product of the image to seek out edges. A position has the one-dimensional form of a ramp and conniving the by-product of the image will highlight its location. In digital image, the questionable edge may be a assortment of the pixels whose grey worth features a step or roof modification, and it additionally refers to the half where the brightness of the image native space changes considerably.

### D. Detection of Tip-

In this stage we tend to shall realize all the finger tips most of ten finger tips gift within the image taken by the digital camera. The hand edge obtained higher than could be a skinny single lined edge that has variant discontinuities. These discontinuities build it troublesome to traverse on the sting of the hand. To beat this drawback, the skinny single lined edge is expanded employing a structuring part to convey a thick edge. On this thickened edge our algorithmic program is run to seek

out the finger tips. We tend to use the subsequent priority structure as given in reference paper whereas traversing the sting to see successive picture element to be tested for bit. Edge thickening is crucial because the edge obtained victimization Sobel might not invariably be good and continuous.

### E. Detection of Touch-

A small region round the fingertips is scanned for shadow; the ideas area unit white whereas the shadow regions area unit black. The magnitude relation of the white to black pixels is set. If the magnitude relation of the realm of non-shadow region to the realm of the shadow region exceeds a specific threshold we are able to say that bit has occurred. The edge is set exploitation and in depth set of check cases.

### F. Mapping-

The final step involves mapping of the fingertips to actual keys. This is a simple 2D mapping based on the information available in the current frame (x, y coordinates) and relative position of the fingertip from the endpoints of the keyboard.

## 4. CONCLUSION

The Virtual Keyboard that we propose uses only a standard web camera, with no additional hardware. This paper addresses problems with current Virtual Keyboard implementations and describes a novel technique, namely shadow Analysis to solve these problems. The objective of this paper is to develop a Virtual Keyboard (VK) using only a standard 2D camera without the need for additional specialized hardware.

Virtual keyboard for mobile devices will remove the inherent space constraints and would therefore provide for a full sized keyboard without additional hardware. In implementation, a Logitech Webcam is used and a sheet of paper with the keyboard printed on it. The only unique aspect of the keyboard is that it has four colored endpoints which are used to identify the keyboard. The implementation is based on use of image processing. We propose Shadow Analysis for detection of webcam based Virtual Keyboard (VK). We introduce detection of edge by simple way like Sobel technique.

The VK presented here is only a small application of a larger idea which detects finger touches using a standard 2D camera. Finally we expect that using Image processing implementation of webcam based Virtual Keyboard 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.

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