# Virtual Keyboard using Hand Gestures

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**Abstract— Recent advancement in Information and Communication Technologies (ICT) open up a scope for computing in Indian languages. Off late, computing devices are evolved in different shapes like cell phone, PDA, iPod etc. In these devices, it is not possible to afford hardware keyboard because of the limitations in size and weight of devices. To alleviate this problem, we are planning to make virtual keyboard. The virtual is an on screen graphics keyboard and is flexible to compare with its hardware keyboard counterpart. There are many reported strategies towards the development of virtual keyboards in English language, but those well-known strategies are not properly applicable for virtual keyboard design in Indian languages.**

***Keywords—virtual keyboard, image processing, thresholding, projection, camera, touchscreen, MATLAB***

## I. INTRODUCTION

Computing machines have the ability to make our daily lives much more convenient. To control these machines, we generally need a controller equipped with a number of keys. A keyboard is an example of a controller that has a diverse range of keys. Nowadays, we are familiar with the various keyboards that control our digital machines such as computers, TV, phones and so on. Thus, as it is to be expected, the physical keyboard is currently the most common human-machine interaction device. However, these physical keyboards are not the ideal solution because an appropriate keyboard or controller must be designed for each specific machine. Additionally, the functions of each individual key must be learned and memorized. In other words, we naturally transfer information through languages, poses, and gestures.

However, machines do not have these biological characteristics and they also cannot understand our intentions.

The most important novelty of the proposed virtual keyboard is that it is very environmentally friendly. It is necessary to spend massive amounts of resources to produce physical keyboards. Consequently, when these physical keyboards become old or broken they are discarded by users and thus generate significant amounts of waste, which is a heavy burden to our environment.

However, the proposed virtual keyboard can be a keyboard printed on plain paper, a projection keyboard on a desk or a laser keyboard on a wall or on any oblique plane. Thus, it is unlikely that the proposed virtual keyboard will lead to environmental pollution.

Secondly, another advantage of the proposed virtual keyboard is that users can replace the virtual keyboard by themselves when they want a new one. It is simple for anyone to abandon the previous paper keyboard and print a new customized one.

## II. LITERATURE SURVEY

Research in the fields of human-computer interaction (HCI) and its use in virtual environments are done a lot lately. Researchers have attempted to use video devices for HCI to identify virtual objects in order to control the system environment. Various natural motions can be identified, tracked, and analysed by utilizing web cameras as the input device. A hand gesture controller, also known as human activity gesture, detects hand movement.

Hojoon Park used the index finger to move the cursor and the angle between the index and thumb to click events.

Chu-Feng Lien controlled the mouse cursor with only his fingertips, and his clicking approach was based on image density, requiring the user to hold the mouse cursor at the target place for a brief time. Fingertip tracking was used by A. Erdem to control mouse motion.

Many researchers in computer science and human computer interaction developed various technologies related to virtual keyboard. However all of them used different techniques. Approaches related to keyboard, where in Eckert. M [1] developed for the persons with physical impairments with presenting a new middleware for mapping gestures, obtained by a motion sensing camera device. Another approach was developed by Zhang, Yunzhou introduced a method by the use of infrared laser module, keyboard pattern projector, embedded system and a single image sensor where every keystroke can be determine accurately by image processing including morphology principle and ellipse fitting[2].

## III. PROPOSED SYSTEM

Virtual Keyboard uses camera, screen and software. This method is easy to use less expensive and even portable such as keyboard. However, the system developed is user friendly.

In previous system the virtual keyboard used projector and camera which used bare-finger touch interaction and the captured 2D image is then recovered. But, due to the use of laser light and projector the battery power is lowered and leads to the limitation. Hence only by using the camera and paper keyboard the virtual keyboard is developed to overcome the drawbacks. The system will work in the following manner shown below respectively,

Keyboard:

1. The keyboard will be drawn on blank paper.
2. A camera will be there to capture live feed of fingers typing on blank paper with keyboard drawn on it.
3. Hence, with the Image processing, in real time typed words on keyboard will be detected.
4. Those words will be screened on desktop.

## IV. RESULTS AND DISCUSSION


Fig. 1


Fig. 2

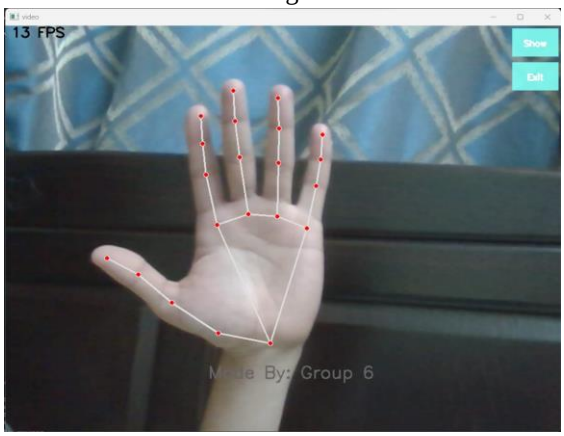


Fig. 3

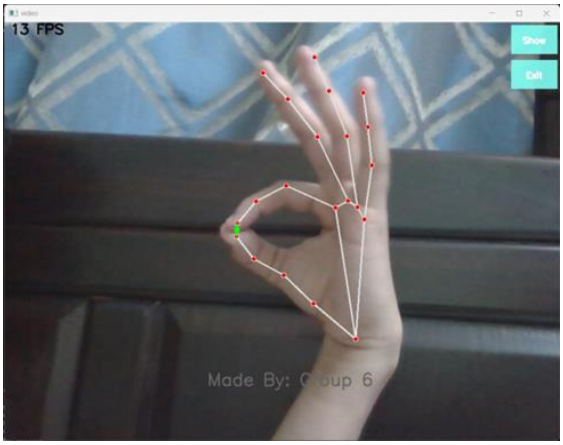


Fig. 4

## V. FUTURE SCOPE

The basic idea of building a virtual keyboard can be expanded upon to build an even better and more user-friendly gadget.

In the short term the following changes can be made to the current concept:

1) Increase in Speed: The operating speed of the gadget can be increased by porting the entire image processing code to C or.NET.

2) Multi-touch compatibility: Our implementation

supports only single touch. It can be extended to multi- touch by use of different colors for tags and color image processing. More sophisticated Image processing algorithms will be needed for better operation.

3) Android compatibility: The virtual keyboard can be adapted for Android based devices by creating a separate app as a device driver. However, more research needs to be done before this can be implemented as the processors of most mobiles or tablets are slower when compared to their PC counterparts. Image processing could use valuable resources on already resource starved device.

4) Integrating with DSP processor: A DSP processor can be integrated in the device itself to be used for image processing. This would overcome the problem mentioned in the previous point, but would increase the cost of the gadget.

5) Building a complete touchscreen-like interface: The entire image of the tablet or mobile screen or PC

## VI. ADVANTAGES AND DISADVANTAGES

Advantages: No extra hardware required, just a touchscreen and some software. Infinitely customizable, use any layout or design and change it with the touch of a button Gestures such as swipe and hold allow more efficient typing, especially with odd characters like ö and £

Disadvantages: No physical sensation of pressing a button results in misfires. Lack of physical divisions between keys makes touch typing impossible Smaller key spacing results in typos.

## VII. AKNOWLEDGMENT

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## VIII. CONCLUSION

We developed a system to get an input of keyboard drawn on a screenr and also to control the mouse cursor using a real-time camera. However, it is difficult to get stable results because of the variety of lighting and skin colours of human races. Most vision algorithms have illumination issues. From the results, we can expect that if the vision algorithms can work in all environments then our system will work more efficiently. This system could be useful in presentations and to reduce work space.

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