Virtual Interactive Keyboard and Mouse Using OpenCV

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Abstract - Today, Computing is not limited to desktops and laptops, it has found its way to mobile devices such as palm tops and even cell phones. However, what has not changed in the last 50 years or so is the information gadget, the QWERTY console gone. Virtual keyboard uses sensor technology to allow users to operate anywhere like a keyboard. This paper develops a computer keyboard viewing application with the concept of image processing. The virtual keyboard must be accessible and functional. The keyboard image will be restored using the camera. The text will be captured by the camera, as we use hand gestures on the workspace console viewing words will be displayed on the screen. The camera will capture finger movements while typing. Therefore, this provides a visual keyboard. This paper also introduces a vision-based mouse that will take links manually as input. The mouse will use our fingers to see our mouse. While building a system that will act as a virtual keyboard that is, with the help of the camera image of the keyboard will be downloaded. Typing will be captured on camera, as we type on a card drawn on paper. The camera will capture finger movements while typing

Keywords - QWERTY Keyboard, Virtual Keyboard, Virtual Mouse,OpenCV, image processing.

I. INTRODUCTION

Computer technology continues to grow, and the importance of interoperable human computers is growing rapidly with the advent of portable devices such as palm tops and even cell phones. But the fact that it has not changed in the last 50 years or so is the input device, the old QWERTY keyboard and visual keyboard technology which is the latest development. Virtual keyboard technology is a non-virtual object system. Visual reality means empowering individual or multiple users to move and respond to a computer simulation. It contains a variety of devices, which allow users to hear and control tangible objects. Computers have been quickly miniaturized from 'space saver' to 'as little as your hand'. Disks and partitions grew smaller in size, but one part remained the same for decades - the keyboard. "Many researchers in the field of human computing and robotic experiments have attempted to control the movement of mice using video devices. However, they all use different methods to create a click-through event. In our project we use both a virtual keyboard and a mouse. With the virtual keyboard we record fingerprint movements we record finger movements with the help of a camera. Thus, the virtual keyboard / mouse that makes human computer interaction easier as a small, useful, well-designed and easy-to-use application, turns into a complete multilingual solution for multilingual text input.

II. LITERATURE SURVEY

Many researchers in computer science and human computer interaction developed various technologies related to virtual keyboard and mouse. 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, Yangzhou 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 determining accurately by image processing including morphology principle and ellipse fitting. Approach related to mouse. One approach, by Erdem to, controls the motion of the mouse by fingertip tracking. A click of the mouse button was implemented on the screen such that a click occurred when a user's hand passed over the region. Another approach was developed by Chu-Feng Lien. He

controls the mouse cursor and clicking event by using the finger-tips movement. His clicking method was based on image density, and required the user to hold the mouse cursor on the desired spot for a short period of time. Paul et al, used some another method to click. He used the motion of the thumb from a 'thumbs-up' position to a fist to mark a clicking event of thumb. By making a special hand sign moved the mouse pointer.Our project was inspired by a paper of Jun Hu. They developed bare- finger touch interaction on regular planar surfaces for e.g. walls or tables, with only one standard camera and one projector. The touching information of finger tips is recovered just from the 2-D image captured by the camera. We used the concept of camera and image processing but without the help of projector and laser light asimple.

III.   EXISTING SYSTEM

Computer Mouse is an input tool that helps to identify and interact with whatever is available pointed. There are many types of mouse in current situation, there is a mechanical mouse consists of a single rubber ball that can rotate in the middle any direction and movement of the pointer is determined by the movement of that rubber ball. Later the mechanical mouse was replaced by the Optical Mouse. The Optical Mouse contains a lead sensor to detect movement of the cursor. Years later a laser mouse was introduced to improve precision and to overcome Optical Mouse obstacles. Later as Technology has greatly expanded wireless mouse was introduced to enable free mouse movement and improve accuracy.

No matter how much the accuracy of the mouse increases but there will always be mouse limitations as the mouse is a hardware input device and there may be some problems such as mouse click and ad malfunction etc. a hardware device like any other visual object even a mouse will have time to function internally and after its hardening time we have to change the mouse keyboard is drawn on paper and the typing movement is taken by the same mouse camera eye movement is captured.
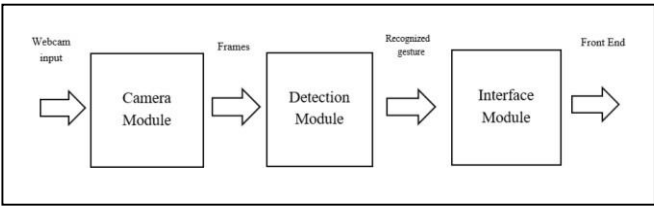
IV.   PROPOSED METHODOLOGY

As technology grows everything becomes made with virtual. Similar to speech recognition, Speech Recognition is used for attention and interpretation of spoken language into text. So, Speech Recognition can replace keyboards in the future, Similarly, Eye Tracking used to control mouse pointer with the help of our eye. Iso Tracing can replace a mouse in the future. Touch can be of any type such as a hand or pixel image a picture of any given situation that requires a little the complexity of the computer or the ability to make the tools needed to make it work. Various strategies proposed by companies to get the required information / data to recognize hand-made touches models. Some models work with special devices such as data gloves devices and color caps will be developed sophisticated contact information provided by the user / person.

V.   MODULES: IMPLEMENTATION

- Collection information,
- Device monitoring (such as a webcam) is activewell or not,
- Collection tape or finger ribbon, appropriateworth the fingers,
- Import packages like NumPy, OpenCV, pynput, mouse,tkinter.
- Use Open Action Function,Fine tuning

Visual keyboard and mouse system use camera. This method is easy to use and inexpensive and portable. However, the advancedsystem is easy to use. The system will operate in the following order shown below respectively.

CAMERA MODULE:

This module is subject to the input capture of various image tags and sends this image to the acquisition module to be treated as frames. The most commonly used methods for capturing and detecting handrails are gloves, data gloves and cameras. In our framework, we use a built-in web camera with financial information to detect static and dynamic signals.

ACQUISITION MODULE:

This module is responsible for image processing. Output from the camera module is displayed in various image handling modes, for example, color conversion, sound removal, the limit that follows when the image exceeds the output of the container. In the case where the image contains errors, at that point convexity errors are detected by touch. In the case where there is no feature, then the image is split using a Haar cascade to detect a touch.

VISUAL CONNECTOR MODULE:
This module is responsible for measuring hand gestures obtained from your associated actions. These actions are then transferred to the appropriate system. The front has three windows. The main window includes the video input taken from the camera and the corresponding action name identified. The following window shows the concerts received inside the input image. The third window shows the smooth familiarity of the image. The advantage of installing a threshold window and contour as part of the Graphical User Interface to let the user know the background. wrong that can affect input system and as a result, they can repair their laptop either desktop webcam to avoid. This will bring about better performance.

PHOTOGRAPHY:

In this first phase we used a webcam to get an RGB image (frame by frame) using the touch of bare hands.

PRE-PROCESSING:

Next, in this step, in order to reduce the calculation time we take an important place instead of the whole frame from the video stream and it is known as the Interest Range (ROI). Image processing works to trick over colored images in a gray image to improve processing and after completing the processing restores images to their original tone, thus appropriately, converting the interesting area into a gray image point to be noted. that at this point the algorithm will fail in the event of any camera vibration.

HAND REGION DIVISION:

This section is important for any process to detect hand gestures and to help improve system performance by removing unnecessary data within the video stream. Basically, there are 2 ways to see a hand in a photo, the first process is based on Skin Color, straightforward but effective with bright conditions in the environment and background background. The next strategy, is on the type of hand and get the benefit from the law of convexity in identifying the hand. Hand gesture is a very important factor in the process of hand recognition (Li & Zhang, 2012). There are many other useful tips for locating a hand in an image that can be summarized as follows:
A. Acquisition of Edge.
B. RGB values as a result of RGB hand values are completely different from the background image.
C. Background Removal This backlash removal method is used to separate the hand from the back. The background is identified by having the process straight to at least 30 frames and thus producing the most effective scale of the latest frames and all using the given number: dst (x, y) = (1- alpha) .dst (x, y) + alpha.src (x, y) where, src (x, y) is an image source can be one or three channels and a floating point of 8 or 32 bits, dst (x, y) destination image containing the same channels as the source image and a floating point of 32 or 64-bits. Finally, the alpha weight of the source image can also be taken as a limit to generate a time- calculating effective measure over the frame. After analyzing the background, we place the hand in front of the camera lens, after which we calculate the complete difference between the background color using the active scale and the current frame containing the hand as the front area thing. This method is called background removal.
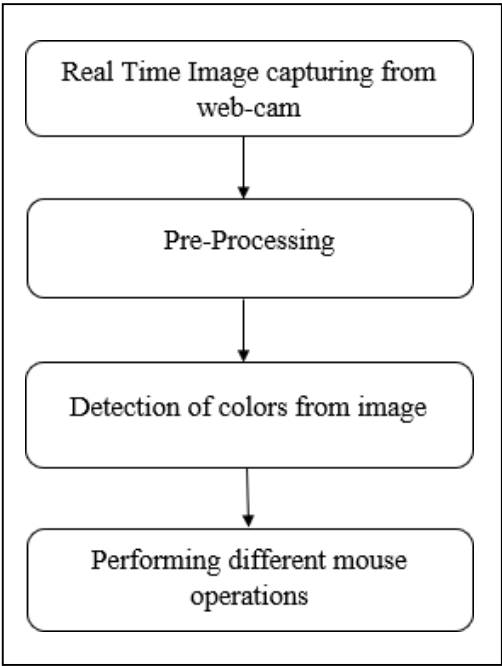
A) BLOCK DIAGRAM

Figure 5.1 Block Diagram of mouse.

B) WORKING
Following are the steps in working of our project:
1) Capturing real time video using Web-Camera:
We will need a sensor to detect the user's hand movements in order for the system to work. As a sensor, the computer's webcam is used. The webcam records real-time video at a fixed frame rate and resolution determined by the camera's hardware. If necessary, the system's frame rate and resolution can be changed. Converting the video captured into HSV format:
The video has also been converted into HSV (hue, saturation, meaning, also called HSB), an alternative representation of the RGB colour model created by computer graphics researchers to better reflect the perception of coloured characteristics by human vision

2) EACH IMAGE FRAME IS PROCESSED SEPARATELY:
After capturing a video, it goes through a short processing phase before it is processed one frame at a time.

3) CALIBRATE THE COLOUR RANGES:
The device enters the mode of operation when it is higher than the steps, which gives all color in accordance with HSV rule in its color scheme, space filling or pricing. each color already has its own set values. To get the right color the user will change the width.
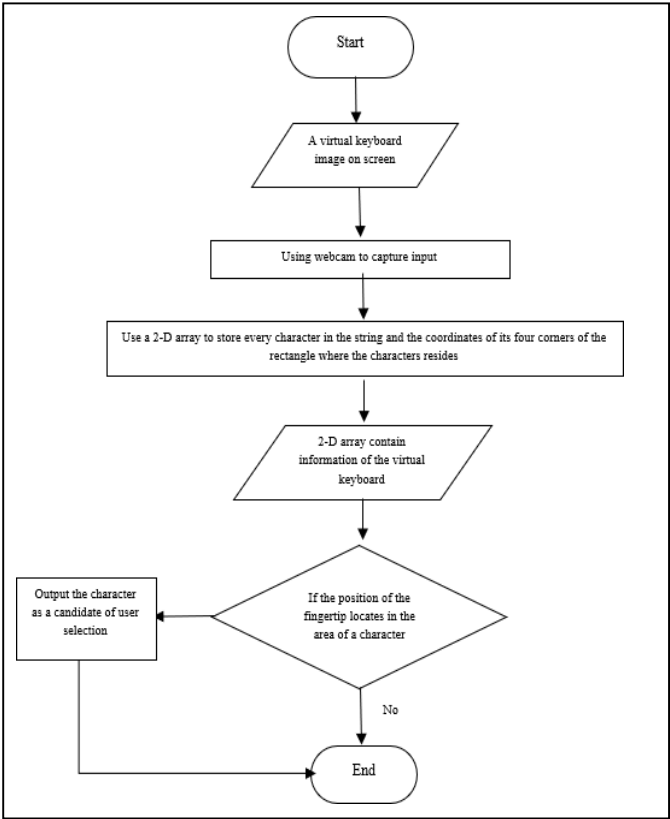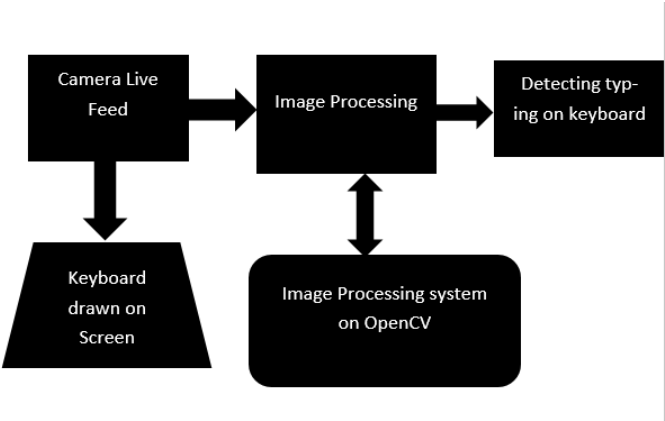
Figure 5.2 Flow Chart Diagram

The virtual keyboard provides computer-readable keyboard information to the entire system no matter what the customized virtual keyboard looks like in reality. The finger recognition subsystem will keep detecting the position of the fingertip in every frame, which means that the program can always track the fingertip on the virtual keyboard. The fingertip moves on the virtual keyboard when fingertip stays on key for more than four frames, the system regards this as a typing action executed by the user. According to the coordinates of where the fingertip has stayed, the corresponding key is found in the virtual keyboard. If there is no corresponding key foe where the fingertip stayed, the virtual keyboard will carry on.

VI.   SYSTEM ARCHITECTURE FORKEYBOARD AND MOUSE

1. KEYBOARD

Keyboard:

I. The keyboard will be displayed on the desktop screen.

II. The camera will be available to capture live feeds of yourfingerprint keyboard.

III. Thus, by processing the Image, in real time the typed words onthe keyboard will be detected.

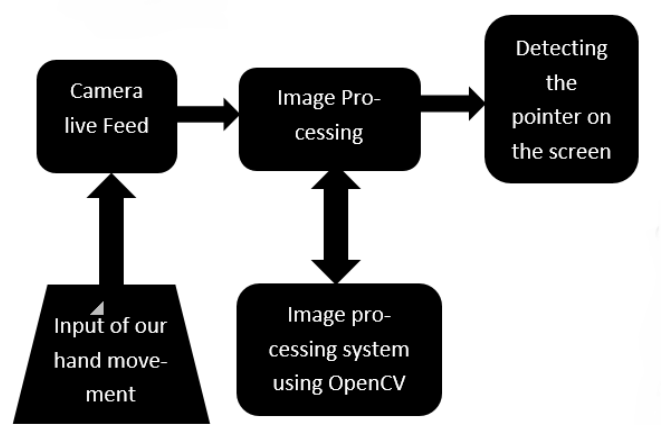IV. Those words will be displayed on the desktop.

2. MOUSE

Figure 6.1. Mouse Implementation

Mouse:

I. The mouse will be represented by use of our finger for recognition of the cursor moments.
II. A camera will be there to capture live feed of our finger movement on the screen.
III. Hence, In the Image processing, in real time movement of finger will be detected.
IV. Those co-ordinates will be taken as the input of the mouse. The mouse will be represented by use of our finger for recognition of the cursor moments.

Figure 6.2. The Basic Block diagram of system

VII. METHODOLOGY

Figure 7.3 Web cam

Web cam is used to capture and recognizes an object in view and tracks the user's hand gestures using computer vision techniques. As input, it sends the data to system. The camera acts as digital eyes seeing what the user sees. It also tracks the movement of hand.

Working of HSV in OpenCV

- The HSV or Hue, Saturation, and value of a given object is the color space associated with the object in OpenCV.

- The Hue in HSV represents the color, Saturation in HSV represents the greyness, and Value in HSV represents the brightness.

- Whenever we want to solve problems related to object detection, it is necessary to use HSV and find the range of HSV.

- The Saturation, and Value in HSV have their own range of values.

- The Hue range in HSV is [0,179], the Saturation range in HSV is [0,255] and the Value range in HSV is [0,255].

- There is also an Upper bound and the lower bound range for a range of each color in HSV.

- The HSV / Hue, Saturation, and value of a given object provide better performance when compared to RGB or Red, Blue, and Green colour space and hence it is used widely in the area of computer vision.
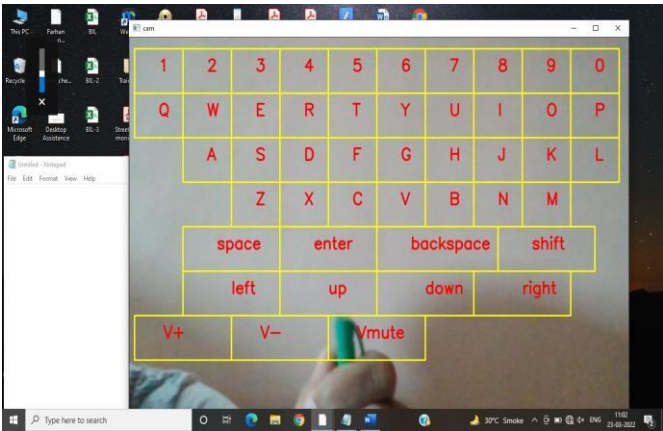
Working of Morphological

Morphological transformations are some simple operations based on the image shape. It's usually done with binary images. It requires two inputs: our original image and a structural element or kernel that dictates the nature of the operation. Erosion and Dilation are the two most basic morphological operators. Then there are various versions such as Opening, Closing, Gradient, and so on.
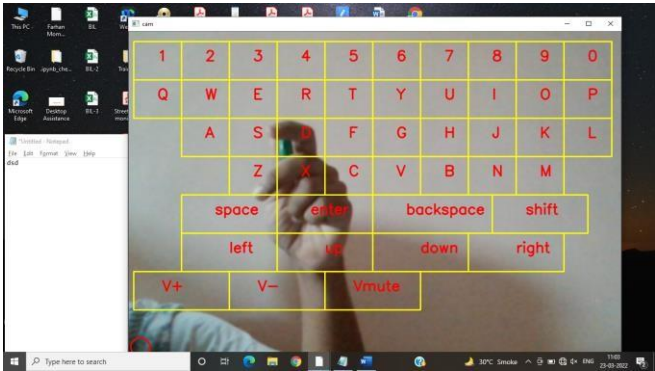
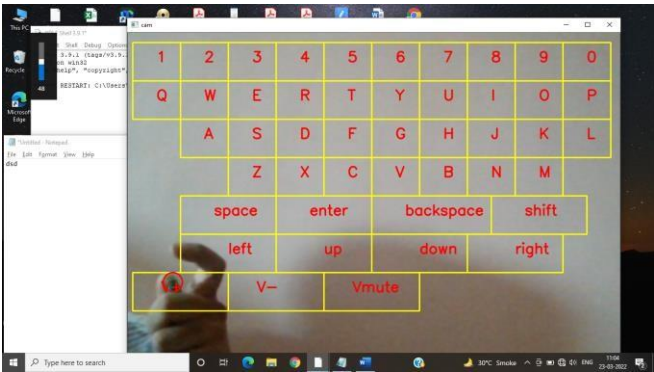## VIII. ACKNOWLEDGEMENT

IX. RESULTS

- **SCREENCAPTURES FROM   KEYBOARDMODULE-**

•The keyboard will be shown on desktop Screen. A camera will be there to capture live feed of fingers typing with keyboard drawn on it
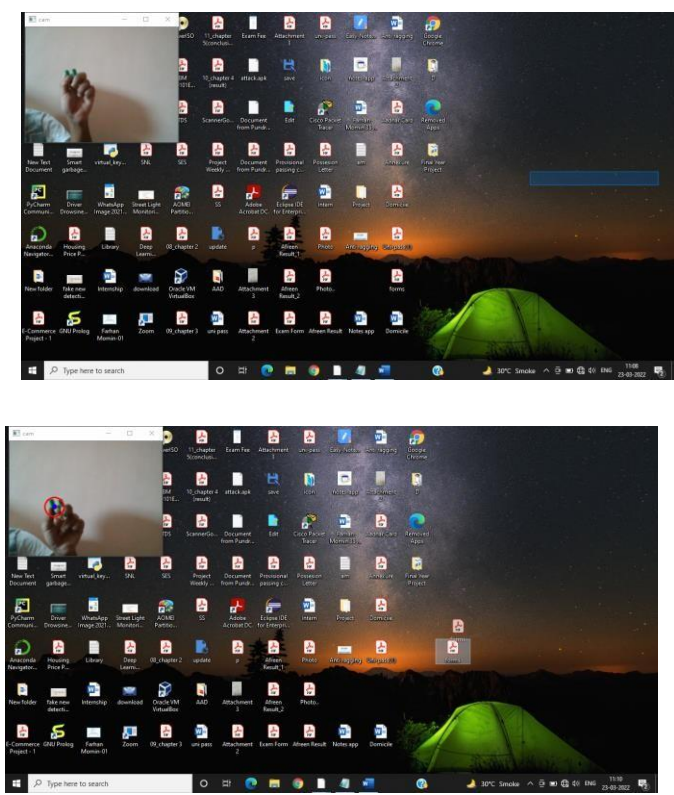

- The image processing will recognize typed words on the keyboardin real time.
- •We are using green cap/tape for live camera detection.
- •Those words will be screened on desktop.

We can change colour of detection by changing HSV range.

- **Screenshots for Mouse**

The mouse will be represented by our finger, which will be used to recognize cursor times.

• A camera will be present to record our finger movement on the screen in real time.

• The movement of a finger will be noticed in real time during image processing.

• The mouse will be used to input those coordinates. The mouse will be represented by our finger, which will be used to recognize cursor times.

X. CONCLUSION

We developed a system to get an input of keyboard colored fingertip movement on the screen and also to control the mouse cursor using a real-time camera. We implemented all mouse tasks such as left and right clicking, double clicking, and scrolling. Based on the findings, we can assume that if the vision algorithms can work in any situation, our system will perform better. This system could be useful in presentations and to reduce work space.

XI. FUTURE SCOPE

Future work of this project includes making the Fingertip detector module invariant to illumination changes and 3D pose estimation of panel which can be used for Augmentation reality of 3D objects. In the future, we'll use various graphic aspects in the human–computer interface to detect touch events on the projected screen (e.g., character form, icon feature). Also, we plan to add more features such as enlarging and shrinking windows, closing window, etc. by using the palm and multiple fingers.

XII.   REFERENCES

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