

# Research on Detecting Hand Gesture

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**Abstract** - This project presents a way to improve real-time visual perception using only webcams and computer vision technologies such as multi-contact detectable image processing for use in computer interactions. almost everywhere we interact with computers. An important feature of this project is to simulate mouse as a visual input device with all its functions like left click, right click

## 1. INTRODUCTION

Today, human computer interactions are mostly interactions with nature. The Graphic User Interface (GUI) on the Personal Computer (PC) is being upgraded, providing an effective visual interface for users to interact with the computer and easily access various applications. Today the technology used for mobile communication is especially the touch screen. But these technologies are still not cheap enough to use on laptops and desktops. We are building a virtual mouse system with easy to use interface and different touch screen. Visual devices (web cameras) may be used and upgraded to new input devices in the future. Provides the installation command for the computer with a computer connection. We can implement additional implementations to convert computer vision tools into an input control device to access a function such as a keyboard or mouse. One way to signal visual aids on a computer is through touch. Live hand gestures are used as signals or input methods. A particular signal can be detected by the computer as input by the computer. This will benefit every user who doesn't need to use a simple device and can do whatever they want as long as the computer vision device can hear you. This makes using the computer easier than using a keyboard or mouse. A future computer or laptop could eliminate the use of a keyboard and mouse in exchange for vision-based translation tools. Human interactions occur in different sensory systems such as touch, speech, facial expressions, and body language. The great advantage of using hand gestures is interacting with the computer as a personal computer input method. Our application provides efficient and easy-to-use methods for intelligent computer interaction and using hand gestures. Mouse functions such as intuitive object movement control have been replaced by hand gestures. Complexity exists consistent with the acquisition and recognition phases of a simulated application. The challenges faced by noisy environments produce severe impairments in the acquisition and functioning of touch in the human hand. The app is designed to be inexpensive and uses inexpensive input tools like webcams for hands as input. Material manipulation is done by means of a preconceived notion based on hand gestures.

## 2. AIM OF THE PROJECT

The main goal is to create an intuitive mouse using a touch screen camera so that we can interact with the computer and easily access different applications.

## 3. SCOPE

- For most laptops, the touchpad is uncomfortable and not convenient
- Real time application
- Easy to use

## 4. PROBLEM STATEMENT

- Visual-based mouse design receives wearable models instead of visual mice.
- Basically for this project using hand gestures recorded by a webcam.
- The camera captures and detects hand movements and performs mouse functions.

## 5. RELATED WORKS

### 5.1 Virtual mouse using gesture hand

- Suggested cursor control system for camera view, using hand gestures taken from webcam by color detection method.
- The system will allow the user to navigate on the computer screen using a hand-held hat or color strip and left-clicking and dragging will be performed with another hand gesture.
- Hand recognition uses a simple color on the finger to operate the pointer using basic hand and touch commands without additional hardware. This is done through the use of intuitive touch recognition and webcam input.

**Advantages** - real time application

**Disadvantages**- User needs color tapes or caps

### 5.2 Virtual Keyboard

The virtual keyboard, or "on-screen" keyboard, allows you to easily and seamlessly type your local language scripts directly from anywhere on whatever computer you're using.

Other common uses of the virtual keyboard include:

- Allow a person to type in their own language on external keyboards
- Provide users with more accessible input by allowing on-screen typing,
- Provides a quick and easy way to switch between different character sets and/or alphabets.

### 5.3 Touch Music Player

The touch player can be used to play songs with hand gestures. That means no keyboard or mouse needed. Touch can include play, pause, next, past, volume up, volume down, etc.

### 5.4 Visual Pian

Intuitive piano functions similar to a virtual keyboard. One can play the piano directly with the help of hand gesture from the card to the corresponding key holding the corresponding piece of music.

### 5.5 Visual Artist

With just one touch, we can draw on the screen. That helps us facilitate our efforts. We can draw the screen easily by touching the body. Traditionally, we use an intuitive mouse. For example, in the window with paint, we use the visual mouse to draw the image. By using visual artist we can easily draw objects with hand movements.

## 6 ANALYSIS AND INTERPRETATION

Input devices such as old mice and peripherals offer only a limited number of them, and they are mainly used for gaming purposes. Legacy devices are finished products or hardware. This is the main reason for the high cost of the product.

Product maintenance is also very expensive. The goal of this project is to implement hand tracking not only for gaming purposes but also for routine use. Since we only use one web camera, costs can be significantly reduced.

### 6.1 EXISTING SYSTEMS

#### 6.1.1 Microsoft Kinect

Kinect is a controllerless gaming experience for the Xbox 360 video game platform. It relies on a webcam-style peripheral add-on to interact with the Xbox 360. It allows users to browse and interact with Xbox 360 without touching a game controller through a user interface that uses gestures, voice commands, or certain objects and images.

### 6.1.2 Leap motion controller

The leap Motion Controller is a small USB device that plugs into a computer. Using an LED light and camera sensor, the leap Motion Controller scans an area approximately 8 cubic feet (2 x 2 x 2) above the device. It tracks both your hands and 10 fingers as they move through the open space between you and the computer, special software detects your hands and fingers and converts the data into information for the computer. yours.

#### Drawbacks

In Microsoft Kinect, the big drawback is that it requires too much space. Cost is another matter. The most frustrating part of the kinect is the menu system at your fingertips. The built-in Xbox menu interface lets you hover over menu blocks for a few seconds before anything happens.

The problem with leap motion is that it follows our 10 fingers if one finger overlaps the other then there is a motion tracking problem. Actual performance may not translate to computer model as expected

## 6.2 PROPOSED SYSTEM

The proposed program is vision-based, using techniques to process and capture images from a web or digital camera. The input frame will be captured on a digital camera, and the system is divided into four stages, skin detection, manual contour removal, skin area to be detected, skin trauma detection. Then the outline of the hand will be detected and used for hand tracking and touch detection. Manual tracking will be used to navigate to PC ID and manual touch will be used to perform mouse functions such as right click, left click, scroll up and scroll down. Therefore, the scope of the project will be the design of a vision-based system.

## 6.3 METHODOLOGY

The main contribution of the recommendation system consists of four parts:

**Skin Detection** - 5 skin color sampler using grayscale values

**Contour Extraction** - Extend the concert of hands using histogram values

**Hand tracking and touch recognition** - Hand tracking using clear image points and algorithms

**Cursor controls** - Mapping touch control to pointer control

Acquiring skin using color detail can be a daunting task, as the appearance of skin in photos is affected by lighting, camera features, background, and quality. To reduce the influence of light, images can be converted to color palettes, which are less sensitive to changes in light. After finding a binary image delimited by skin elements, edge detection is performed to find the gigs in the image using the OpenCV cvFindContours() function.

Cursor movement is controlled by the tip of the finger. To see the fingertips, you must first find the center of the palm. The shortest distance between each point in the circle is engraved into the measured lance and the point of the largest distance has been recorded as an organization. The distance between the navel of the hand and palms is considered the width of the hand. The center of the hand is calculated throughout the sequence and using the manual center, when discovering the hand gestures, it will be a simple question about hand-edged gestures completely different from functions Specific mice. It seems to control your computer pointer.

**RGB image** - RGB images, sometimes called TrueColor images, are a series of data that puts red, green and blue components for each individual pixel. A pixel with color components of (0,0,0) displays as black, and a pixel with color components of (1,1,1) displays as white.

HSV image consists of three parts

"Hue" is more specifically described by the dominant wavelength and is the first factor we refer to when adding the three components of a color. Hue is also a term that describes the one dimension of color that we easily experience when looking at color, or its purest form; it basically refers to a color with full saturation

**Value** - The value refers to the lightness or darkness of a color. It indicates the amount of reflected light. When dealing with pigments, dark values that add black are called shades of the given color name. Light values with the addition of white pigment are called tints from the color name. The value just refers to the lightness or darkness of a color. If a color is called "low value" it means it is darker in nature think closer to earth (dark ground) and if it is called "high value" it means it has obviously darker nature think closest to the whitest, brightest sky.

**Saturation** - Saturation determines the brightness and intensity of the color. When a color is tinted, white and black (gray) are added to the color to reduce the saturation of the color. When a color is highly saturated, the intensity of the pigment is vivid and bright. When a color is desaturated or unsaturated, the color appears "grayed out" or muted.

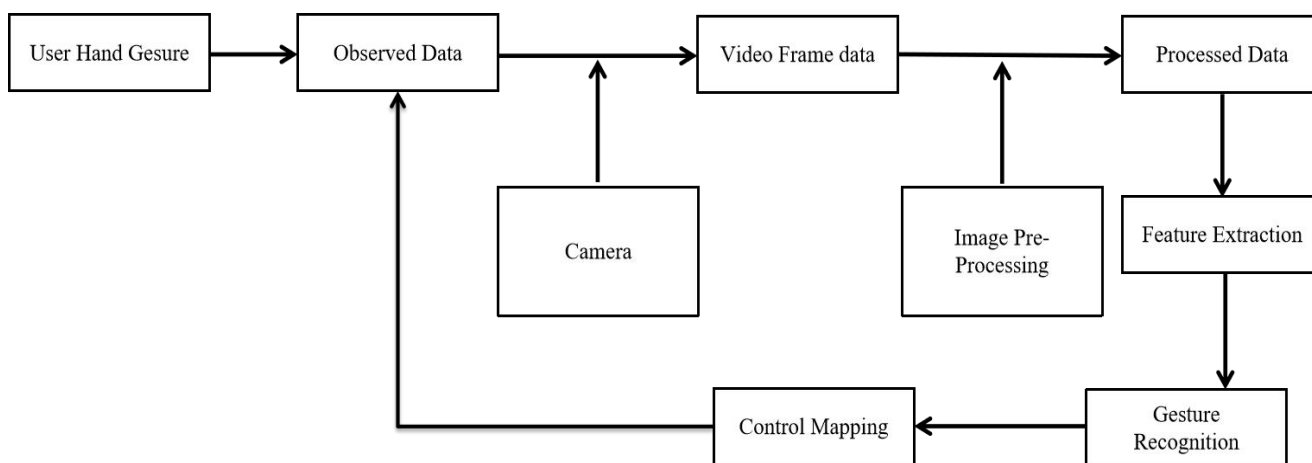
**Grayscale images** include two important pieces of information: the change in grayscale and the local geometrical features of the image. A primitive sketch is a primitive mode of expression that can fully and unambiguously represent information. Much of the information in the early sketches focuses on the rapid change in grayscale from the actual edges and ends. Each edge grayscale change has a corresponding description, including edge grayscale change rate, total grayscale change, length, curvature, and edge orientation. Erosion and dilation

**Erosion and dilation** are morphological image processing operations. OpenCV morphological image processing is a procedure for modifying the geometric structure of an image. In metamorphosis we find the shape and size or structure of an object. Both operations are defined for binary images, but we can also use them on grayscale images. They are widely used in the following ways:

- Noise Reduction
- Identifies any intensity bumps or holes in the image.
- Split individual elements and place different elements in the image.

**Smoothing and thresholding** are used to see the useful part of the image, while smoothing is used to remove noise from the image. The images captured by the camera are usually in an analog format and are therefore digitized by sampling. The scanned images are stored in the computer as arrays of pixels. Each pixel contains information such as the color or intensity of that part of the image. The pixel size depends on the sample size of the scan. In image thresholding, each pixel value is set to black or white based on a user-defined threshold value. When smoothing, the pixel value is set based on the value of the neighboring pixels.

### 6.4 BLOCK DIAGRAM



### 7 CONCLUSION

In this project, a track-based mouse application was developed and deployed using a webcam. The program is executed on behalf of PYTHON. We implement mouse functions like left and right click. Most applications require additional, often more expensive, hardware. The aim is to make the technology cheaper and older under the standard operating system. Various application programs can only be written for this technology to create many types of applications with minimal resources.

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