

# OPERATING COMPUTERS THROUGH HAND GESTURES

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## Abstract

The term sixth sense includes the eye, ear, nose, tongue, body, and mind and we humans are totally depend on it. The Technology to discuss is kind of the functions related to the eye, ear, nose, tongue, body, and mind. We use our computers by just sitting in front of our computer and in the use of few senses. But after the introduction of the "Sixth Sense Technology", a computer can sense any sorts of feelings it gets in its surroundings. In this paper, we discuss about this technology and its use that allow us to operate our computers using our gestures. We also discuss the scope of this technology and its future perspective.

We play with the objects in the physical world but the idea behind this technology is to paint the physical world with the digital information.

## Prototype

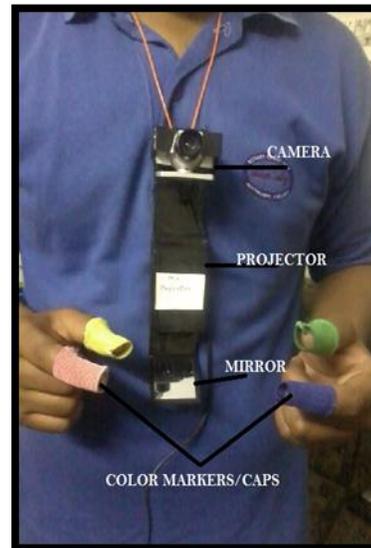


Fig 2: Prototype Model

## Introduction

There are number of objects that we use in our day to day life and we interact with the physical objects that surrounds us. Unlike our number of computing devices these objects are fun to use[1]. When we talk about objects a very important term that is directly related to objects is "gestures" i.e. how we manipulate these objects and use these objects in our day to day life. We use these gestures to interact with the object like in cricket when the umpire raises his finger towards the sky, no one teaches that it means out, it automatically comes in as a part of our day to day learning[4]. With the help of this technology, we made an attempt to use this knowledge about these objects and use it to interact with the digital world. Rather than using keyboard and mouse, we use the computer in the same way we used to interact with the physical objects.

The components of this wearable gestural interface are following:

- 1) *Camera*: It captures an object in view and track the hand gestures. It acts as a digital eye that connects to the physical world. It is also responsible for sending the data ( pictures, hand gestures ) to the smartphone/ laptop that you are using to process the data.
- 2) *Projector*: It receives the information sent from smartphone / laptop and is used to display that processed information or data on any surface (wall, palm, object, person ).
- 3) *Mirror*: The usage of the mirror is significant as the projector dangles pointing downwards from the Neck.

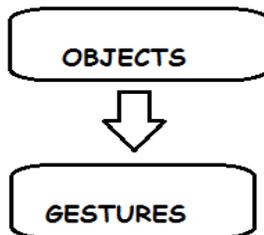


Fig 1: Relation between Objects and Gestures

4) Color Markers/ Caps: It is at the tip of the user's fingers. The movements and arrangements of these markers are interpreted into gestures that act as interaction instructions for the projected application interfaces. Marking the user's fingers with red, yellow, green, and blue tape helps the camera to recognize gestures.

5) Smartphone/Laptop: It is used to process the data that it receives from Camera and interprets the hand gestures and then sent the processed information to projector for display.

### Working

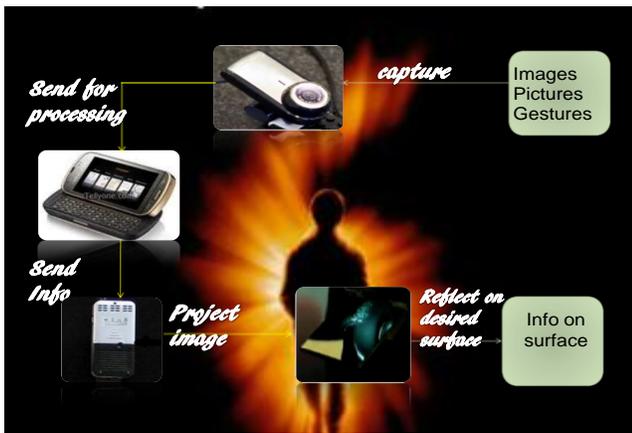


Fig 3: Working Model

The images, gestures and pictures are captured or tracked by camera and then sends this information to Smartphone/laptop for processing. The Smartphone processes the data by interpreting gestures[2]. This processed information is then sent to projector to project the information / data on any surface using mirror. If projector is not to be used, the webcam of our laptop can be used as a camera and we can operate our laptops using hand gestures. With the help of this technology, we can operate our OS using hand gestures. In case of Windows, we can simply open calculator , paint , notepad applications by making simple gestures.



Fig 4: Gestures Making

### Applications

- A. Browser Application  
In this application, we can search the web using our gestures and can work on facebook, twitter or any web site using our gestures. A virtual keyboard will be used and will be operated through our gestures.
- B. Scan Application  
We can use this application as a scanner and this will provide all the functionalities of a scanner without using hardware of a scanner. We capture a picture using camera and then sends to smartphone and then this application will convert the .jpeg/ .png to text document.
- C. OS Application  
This application allows us to use any application of OS such as calculator, notepad, paint using our gestures.
- D. Weather Application  
This application provides us an interface that allows us to see weather report of any part of the world using our gestures but the internet access is mandatory.
- E. Stock Application  
This application allows us to see stock market exchange by providing us an interface that can be operated using our hand gestures.
- F. Cut n Paste Application  
This application allows us to cut anything at anywhere on the screen and paste it.
- G. Gallery Application  
This provides us a collection of all the pictures that are captured and supports zoom in and zoom out feature using our gestures.

### Existing Technologies

Paper	Primary method of recognition	Number of gestures recognised	Background to gesture images	Additional markers required (such as wrist band)	Number of training images	Accuracy	Frame rate
[Bauer & Hienz, 2000]	Hidden Markov Models	97	General	Multi-coloured gloves	7-hours signing	91.7%	-
[Starner, Weaver & Pentland, 1998]	Hidden Markov Models	40	General	No	400 training sentences	97.6%	10
[Bowden & Sarhadi, 2000]	Linear approximation to non-linear point distribution models	26	Blue screen	No	7441 images	-	-
[Davis & Shah, 1994]	Finite state machine / model matching	7	Static	Markers on glove	10 sequences of 200 frames each	≈98%	10

Fig 5:Existing Systems

There was a time when it was very difficult for the humans to operate computers but as the time passes humans find themselves comfortable while working with computers. Similarly, this technology provides a new turn in the field of science and technology.

## Conclusion

This technology helps us to know how to integrate with digital world and also how to paint physical world with digital information and allows us to carry our own digital world with us where ever we go[3]. This technology improves our quality of living and makes it much better as it cut down the cost of basic necessities and everything will be at the tip of our fingers. This technology is very cheap as it costs only 350\$. This technology also has a lasting potential as a number of steps have been made to future this product.

## References

- [1] P. Mistry, P. Maes. SixthSense – A Wearable Gestural Interface. In the Proceedings of SIGGRAPH Asia 2009, Sketch. Yokohama, Japan. 2009
- [2] P. Mistry, The thrilling potential of Sixth sense Technology, TEDIndia 2009, Mysore India 2009
- [3] P. Mistry, P. Maes, L. Chang. WUW - Wear Ur World - A Wearable Gestural Interface. In the CHI '09 extended abstracts on Human factors in computing systems. Boston, USA. 2009
- [4] P. Maes, P. Mistry. Unveiling the "Sixth Sense," game-changing wearable tech. TED 2009. Long Beach, CA, USA 2009

## Biographies

**MONICA BANSAL** is currently pursuing the B.TECH degree in Information Technology Engineering from the University of Maharashi Dayanand University, Rohtak, Haryana. She is Currently working on her final year project titled “Wear Ur Project” those objective is to Operate our computers through Hand Gestures.