

# A Wearable Gesture Interface

Naveen Kumar Pandey, Ankita Srivastava, Abhishek Kumar

Department of Computer Science & Engineering, Institute of Technology and Management, Gida , Gorakhpur , UP, India

**Abstract-** Information is traditionally confined to paper or digitally to screen. In this paper, a wearable gesture interface, this attempts to information out into a tangible world. This interface connects the physical world around us with the Digital Information.

By using a tiny projector and a camera, mounted on hat or coupled in a pendant like wearable device , it sees what the users see and visually augment surfaces or physical objects the user is interacting with . The mini projector which is connected to a camera and a cell phone- that acts as a computer which is connected to a cloud. The camera sense the objects around us . Wearable gesture interface projects information onto surfaces walls and physical objects around us , and let the user interact with the projected information through natural hand gestures , arm movements or interaction with the objects itself.

**Index Terms-** Sixth Sense Technology, Augmented Reality, Evolution, Applications, Digital World

## I. INTRODUCTION

The main theme of this paper is to take the Six Sense Technology to a new platform-to perceive what the human mind thinking or wants or to do next ,what all things are going in one mind, so that one can get the things done before actually describing it. This idea could be implemented with the help of NEURONS-which are specialized cell for transmitting nerve impulse, i.e.-a nerve cell. Sixth Sense is a revolutionary technology that can be used to access digital information in the world with wearable gestures. Now we are taking it to a new platform where it would read the human brain. The Sixth Sense prototype is comprised of a pocket projector, a mirror, colored marker and a camera. These components are coupled in a pendant like mobile wearable device. The camera, mirror and projector is connected wirelessly to a blue tooth smart phone device that can easily fit into the user's pocket.. The key here is that sixth sense recognizes the objects around you and displaying the information automatically and letting you access it in any way you want .Six sense technologies is a wearable gesture based device that augments the physical world with the digital information and let's people use natural hand gestures to interact with the information. It was developed by PranavMistry, a Phd Student in the fluid interfaces Group at MIT laboratory; he waved the curtain of six sense technology. It involves the reception of information not gained through any of our five senses, It works besides the five senses. Infact six sense technology is the blend of computer, internet, camera and mobile phone. It works as the wearable device that is hanged around the neck of a person and thus the projection starts by the mean of micro projector attached to device. It is based on the concepts of

augmented reality and has well implemented the perceptions of it. Sixth sense technology has integrated the real world objects with digital world. The fabulous 6th sense technology is a blend of many exquisite technologies. The thing which makes it magnificent is the marvelous integration of all those technologies and presents it into a single portable and economical product Future generations will likely marvel at the fact that human will be able to communicate without the help of words or emotion, they can directly implement what all they want simply with the help of some symbolic gestures. Six Sense has really made the things easy and simple with the computations performed within seconds and with the smaller size of the devices. The device sees what we see but it lets out information that we want to know while viewing the object.



Fig 1 Six Sense

It can project information on any surface, be it a wall, table or any other object and uses hand /arm movements to help us interact with the projected information. The device brings us closer to reality and assists us in making right decisions by providing the relevant information, thereby, making the entire world a computer. The Sixth Sense prototype implements several applications that demonstrate the usefulness, viability and flexibility of the system. The map application lets the user navigate a map displayed on a nearby surface using hand gestures, similar to gestures supported by Multi-Touch based systems, letting the user zoom in, zoom out or pan using intuitive hand movements. The user can stop by any surface or wall and flick through the photos he/she has taken. Sixth Sense also lets the user draw icons or symbols in the air using the movement of the index finger and recognizes those symbols as interaction instructions. For example, drawing a magnifying glass symbol takes the user to the map application or drawing a '@' symbol lets the user check his mail. The Sixth Sense system also augments

physical objects the user is interacting with by projecting more information about these objects projected on them.

## II. WHAT IS SIXTH SENSE?

Sixth Sense in scientific (or non-scientific) terms is defined as Extra Sensory Perception or in short ESP. It involves the reception of information not gained through any of the five senses. Nor is it taken from any experiences from the past or known. Sixth Sense aims to more seamlessly integrate online

information and tech into everyday life. By making available information needed for decision-making beyond what we have access to with our five senses, it effectively gives users a sixth sense.

## III. SIXTH SENSE PROTOTYPE

### 3.1 Earlier Six Sense Prototype



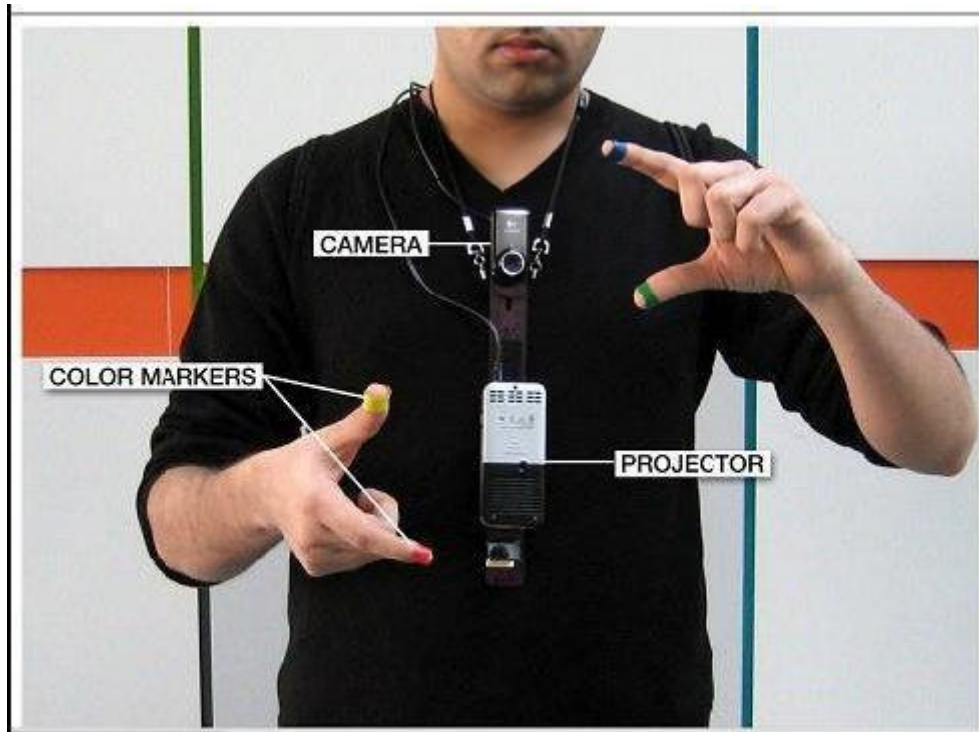
**Fig 3. Six Sense Prototype**

Mae's\_ MIT group, which includes seven graduate students, were thinking about how a person could be more integrated into the world around them and access information without having to do something like take out a phone. They initially produced a wristband that would read a Radio Frequency Identification tag to know, for example, which book a user is holding in a store. They also had a ring that used infrared to communicate by beacon to supermarket smart shelves to give you information about products. As we grab a package of macaroni, the ring would glow red or green to tell us if the product was organic or free of peanut traces whatever criteria we program into the system. They wanted to make information more useful to people in real time with minimal effort in a way that doesn't require any

behaviour changes. The wristband was getting close, but we still had to take out our cell phone to look at the information.

That's when they struck on the idea of accessing information from the internet and projecting it. So someone wearing the wristband could pick up a paperback in the bookstore and immediately call up reviews about the book, projecting them onto a surface in the store or doing a keyword search through the book by accessing digitized pages on Amazon or Google books. They started with a larger projector that was mounted on a helmet. But that proved cumbersome if someone was projecting data onto a wall then turned to speak to friend the data would project on the friends face.

### 3.2 Recent Prototype



**Fig 3.2 Recent Prototype**

Now they have switched to a smaller projector and created the pendant prototype to be worn around the neck. The Sixth Sense prototype is composed of a pocket projector, a mirror and a camera. The hardware components are coupled in a pendant-like mobile wearable device. Both the projector and the camera are connected to the mobile computing device in the user's pocket. We can very well consider the Sixth Sense Technology as a blend of the computer and the cell phone. It works as the device associated to it is hung around the neck of a person and thus the projection starts by means of the micro projector attached to the device. Therefore, in course, you turn out to be a moving computer in yourself and the fingers act like a mouse and a keyboard. The prototype was built from an ordinary webcam and a battery-powered 3M projector, with an attached mirror — all connected to an internet-enabled mobile phone. The setup, which costs less than \$350, allows the user to project information from the phone onto any surface walls, the body of another person or even your hand. Mistry wore the device on a lanyard around his neck, and colored Magic Marker caps on four fingers (red, blue, green and yellow) helped the camera distinguish the four fingers and recognize his hand gestures with software that Mistry created.

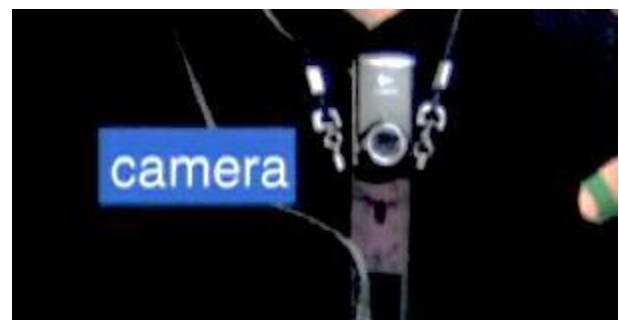
#### IV. COMPONENTS OF SIX SENSE

The main components of Sixth Sense Technology are as follows:

##### 4.1 Camera

This component is present at the head of the Sixth Sense Technology pendant. The function of this camera is just like that

of a human eye, the only difference being it will provide digital information. This camera is capable of capturing the images that falls within its vision and also it provides information about the objects present in front of it. The hand gestures performed by the user can be tracked with this component. Additionally, facial recognition is supported by this device. The information collected by camera is processed by the connected mobile component



**Fig 4.1 Camera**

##### 4.2 Color Markers

This technology makes use of four color markers: red marker, green marker, blue marker and yellow marker. The user can wear these markers at the tip of their fingers which helps the camera to track hand gestures. These gestures can perform various tasks such as painting, taking a picture and many more.



**Fig 4.2 Colour marker**

#### 4.3 Mobile Component

One of the most important components of this technology is the mobile module. The function of this component can be carried out by any device such as smartphone, personal digital

assistant, laptop etc. as long as it is mobile and web-enabled. It is a processing engine that processes the data obtained from camera and sends the output to projector.



**Fig4.3 Mobile component**

#### 4.4 Projector

The projector is basically an output gadget which is used to display any information provided by the mobile component. Projector can project information on any kind of physical surface such as a wall, palm of user's hand, a paper etc. and the user can interact with it.

The use of mirror is important as the projector dangles pointing downwards from the neck. The mirror reflects the image on to a desire surface. Thus the digital image is freed from its restriction and placed in the physical world.



**Fig4.4 Projector**

#### 4.5 Mirror



**Fig 4.5 Mirror**

#### 4.6 Microphone

This component is used only when the projection is to be done on a piece of paper. Microphone in form of a clip is affixed

on that piece of paper. The information written by user on that paper is recognized by the camera by interpreting the sound of user's touch.



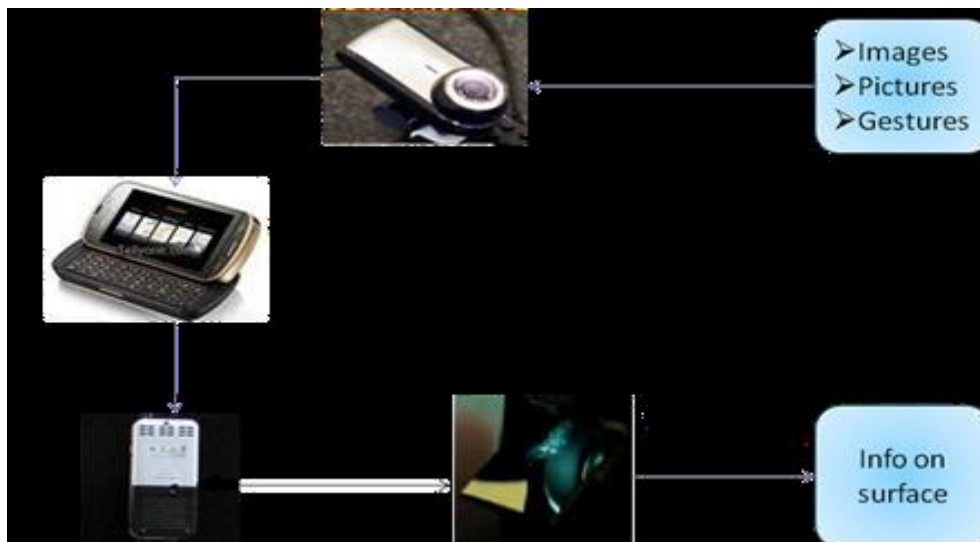
**Fig 4.6 Playing Games Using Microphone**

The camera is also capable of detecting the motion of the paper held in hand.

interacting with. A number of standard gadgets are connected including a mini projector, camera, mobile phone, microphone and a mirror. The mobile phone acts as a computer and our connection to web where all the information is stored.

#### V. WORKING

Sixth sense device analyses whatever the user is watching and it augments the surfaces and physical objects user is



**Fig 5 Working of Six Sense**

The components in the device are managed by a mobile phone device carried by the user. The microphone and the projector are connected to the mobile phone device. The projector, projects the information enabling surfaces, walls and physical objects around the user to be used as interfaces. The microphone is trained frequently with commands; the device stores these commands which were trained by the user and executes the corresponding action through the projector.

The user gives the input to the device and when the input is received to the microphone, the command is processed and is sent to the mobile device. The mobile device interprets the command and is passed on to the projector. The projector output is seen on the screen through the mirror for accurate projection. The tips of the user's fingers are covered with red, yellow, green and blue colored tapes. Therefore it helps the camera to recognize the hand gestures. The movements of the user's fingers recognized into gestures that acts as an interaction instruction for

the device. The Sixth Sense technology is a blend of computer along with a cell phone.

## VI. RELATED TECHNOLOGIES

There are following some technologies that are related to the sixth sense technology.

### 6.1. Augmented Reality

It is a term for a live direct or indirect view of a physical real world environment whose elements are linked by virtual computer generated imagery.

### 6.2. Gesture Recognition

It is a language technology in computer science that interprets human gestures via mathematical algorithms.

### 6.3. Computer Vision

In Computer vision technology, the necessary information is interpreted / extracted from an image by machines.

## 6.4. Radio Frequency Identification

Radio Frequency Identification is an electronic tagging technology that permits the tracking, detection of tags and consequently the objects that they are attached to.

## VII. APPLICATIONS

**7.1. Motion Capture:** The new camera was praised by majority people at the time of demonstration. The pictures can be edited, managed into galleries and shared on any interface. The data is stored inside an inbuilt storage device. At the time of using a surface, the entire data is taken into that surface and after editing, it is stored in the device.

**7.2. Capturing Photos using Fingers:** The burden of carrying a camera and keeping it safe and sound on a trip can now be avoided by simply using the Sixth sense technology. The sixth sense computer works as a camera. By making a square with our fingers and specifying the image we want to frame, the camera takes the photo.



Fig 7.1 Capture Pictures Using Frame Gesture

**7.3. Check the Brand of the Product:** A product of the best brand can be chosen.



7.2 Capture Pictures Using Frame Gesture

**7.4. Reviewing Flight Status:** Any background can be used to project a screen, on which the status of flight can be checked by placing the ticket in front of this technology.



**Fig 7.3 Reviewing Flight Status**

**7.5. Time without watch:** Time can be viewed merely by drawing a circle on the wrist.



**Fig 7.4 Time Without Watch**

**7.6. 3D Drawing:** Instead of physically wearing a wristwatch Provides a pencil that allows users to draw in 3D, a good way to learn for the beginners in the field of 3D modelling.

**7.7. Call using palm as dialler:** It gives the provision of using the hand as a screen onto which the dialler is projected, using which an individual can make a call.



**Palm Dialer**



**Video Newspaper**

**Fig 7.5 Call Using Palm**

**7.8. Video newspaper:** It determines the news headline and the displays the appropriate video.

**7.9. Zoom in Zoom out:** It helps to view images and related things in the way one wants to see.



**Zoom in**



**Zoom out**

**Fig 7.8 Zoom in Zoom out**

## VIII. ADVANTAGES

8.1. Sixth Sense is a user friendly interface which integrates digital information into the physical world and its objects, making the entire world your computer.

8.2. Sixth Sense does not change human habits but causes computer and other machines to adapt to human needs.

8.3. It uses hand gestures to interact with digital information, supports multi-touch and multi-user interaction.

8.4. Data access directly from machine in real time. It is an open source and cost effective and we can mind map the idea anywhere.

8.5. It is gesture-controlled wearable computing device that feeds our relevant information and turns any surface into an interactive display.

8.6. It is portable and easy to carry as we can wear it in our neck.

8.7. The device could be used by anyone without even a basic knowledge of a keyboard or mouse. There is no need to carry a camera anymore.

8.8. If we are going for a holiday, then from now onwards it will be easy to capture photos by using mere fingers.

## IX. FUTURE ENHANCEMENTS

9.1. To get rid of colour markers.

9.2. To incorporate camera and projector inside mobile Computing device.

9.3. Whenever we place pendant-style wearable device on table, it should allow us to use the table as multi touch user interface.

9.4. Applying this technology in various interest like gaming, education systems etc.

9.5. To have 3D gesture tracking.

9.6. To make sixth sense work as fifth sense for disabled person.

## X. FUTURE USE

A wearable gesture interface or the Six Sense Technology can be very effective and useful in future for disabled persons who are not able to express themselves not able to speak out or hear or understand things. It could also serve as a boon in medical sector, such as for "COMA patients", who are not able to respond to external stimuli and only their mind alive while the rest of the body is dead. Six Sense can also be used in defence system. The wearable gesture interface can be attached as "Sixth Sense Brain" and it reads the mind gesture and performs task accordingly. This enhancement in the technology can make it very useful as well as can give a new life to all the disabled patients.

## XI. CONCLUSION

Use of gesture movement and speech integrated circuits has made sixth sense technology an emerging innovative idea. It

provides us a smooth access to information that may help us to make crucial decisions. The ultimate power of Sixth Sense lies within the potential it holds to connect Internet with the real world and superimposing the data on the world itself. Although upcoming technologies like 5 pen PC technology allow us to carry computers alongside with us in our pockets, a link between the digital devices we can carry and its interactions with real world, also our speech, has not yet been found. The masterstroke here is that Sixth Sense identifies the objects around oneself, let us access the information in the way we want and displays that information as well, all this in the most simplest of the ways. Felicitous awareness of this technology will point to even further development and use of this technology, which in-turn will aid in obtaining information and operating any type of function practically at any time. And this can be achieved simply by using gestures and commands.

Clearly, this has the potential of becoming the ultimate "transparent" user interface for accessing information about everything around us. If they can get rid of the coloured finger caps and it ever goes beyond the initial development phase, that is. But as it is now, it may change the way we interact with the real world and truly give everyone complete awareness of the environment around us.

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#### AUTHORS

**First Author** – Naveen Kumar Pandey,  
([naveen.nkpandey@gmail.com](mailto:naveen.nkpandey@gmail.com)), Deptt. Of Computer Science & Engineering, Institute Of Technology and Management , Gida , Gorakhpur , UP

**Second Author** – Ankita Srivastava,  
([ankita.srivastava.ankita@gmail.com](mailto:ankita.srivastava.ankita@gmail.com)), Deptt. Of Computer Science & Engineering, Institute Of Technology and Management , Gida , Gorakhpur , UP

**Third Author** – Abhishek Kumar, Deptt. Of Computer Science & Engineering, Institute Of Technology and Management , Gida , Gorakhpur , UP

**Under the Guidance** – Prof. Nafees A. Farooqui, Deptt. Of Computer Science & Engineering, (Institute of Technology and Management , Gida , Gorakhpur , UP)