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## The Sixth Sense Technology: Survey paper

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### Abstract

Humans have five basic senses which are feeling, tasting, hearing, seeing and smelling. The sense which particularly enhances human's analysing power is their "Sixth Sense". As the sixth sense provides more efficiency to humans, Sixth Sense technology makes the ordinary computers more interactive. Sixth sense technology bridges the gap between physical and logical world. It helps to take the correct decisions and improve the knowledge. Sixth Sense technology basically is the technology, based on Gesture recognition, which brings the virtual world into the physical world and this is achieved by a mobile wearable device resembling to a pendant. The different types of gestures are used in it such as facial expressions, hand, eye, symbolic expressions, gait, sound and speed. The technologies like Augmented Reality; Computer Vision also supports this technology. Steve Mann is considered to be the "Father of Sixth Sense Technology" as he was the first one to develop this idea. Later, Pranav Mistry, a PhD student in the Fluid Interfaces Group at the MIT Media lab, developed this idea. This pendant includes primarily camera, projector and a smart phone. This technology enables any surface or wall into a touch screen. Even we can access information about any particular object or entity or also used to store the information to the cloud. Thus, this technology brings us in absolutely imaginary world and has brought the new era in technology. In this paper, we have reviewed the portable sixth sense technology, its working, how it augments the physical world and its applications.

**Keywords-Sixth sense, camera, projector, pendant, cloud**

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### 1. INTRODUCTION

Technology has brought miniaturization of many digital devices. This helps us in carrying these computing devices in our pockets. But the Six Sense technology has brought up revolution and has bridged the gap between our digital devices and our interactions with the environment.

Sixth Sense Technology is defined as Extra Sensory Perception (ESP)<sub>[1]</sub>. It is the wearable gestural interface that extends the physical environment surrounding us with digital information and allows us to interact with that information using natural hand gestures. This technology was developed by Pranav Mistry who is a PhD student in the Fluid Interfaces Group at the MIT Media Lab. This technology has brought the virtual/digital information out into the real physical world and allows us to interact with it using natural hand gestures. The objective of Sixth Sense is to integrate online information and technology into everyday life seamlessly. The hardware components used here are united in a mobile wearable device resembling to a pendant. The hardware components are a

pocket projector, a mirror and a camera. The camera will instantly detect any object while the micro-projector will project the information on any surface. Further, using fingers one can access or manipulate the projected information.

This new emerging technology will soon update our ordinary computers with the ability to sense different feelings hoarding in our surroundings.

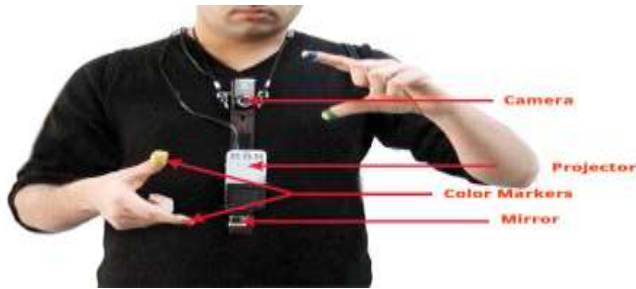
### 2. LITERATURE REVIEW

The idea of this interesting technology started developing in late 1990's by Steve Mann. He was the first person to who actually proposed first wearable computer. Further in 1994, he attempted to propose a head worn projector and camera. And in 1998, he developed and proposed it as neck worn projector. Later, this idea of implementing computer technologies to daily task of Sixth sense technology was developed by Pranav Mistry, a PhD student in the Fluid Interfaces Group at the MIT Media Lab. The first proposed neck worn projector was switched to a smaller projector and a pendant prototype was created. These advancements were done by Pranav Mistry.

This archetype was built from an ordinary webcam and a battery with an attached mirror and all connected to an internet-enabled mobile phone here.

Pranav Mistry first tried out his idea on a simple computer mouse. He put rollers into mouse and observed if he could obtain data and guide the movements of the mouse. The two rollers did not work properly so he decided to use four rollers and see it could work better. Four rollers give the idea that he could use the similar idea on fingers and that was the next he moved on to.

### 3. COMPONENT



**Fig-3.1**

#### 1. Camera:

It is a key input device which present at the head of sixth sense technology. It acts as a digital eye of the system. It track the hand gesture of user by grabbing the motion of coloured marker which is worn on his fingertips. It capture the scene by using users hand movements and gesture.

#### 2. Projector:

It is a key output device of sixth sense technology which project visual information enabling walls, surfaces and physical object used as interface. It runs on rechargeable battery. The data sent from the smart phone on any surface in view- object, wall or person is displayed by a tiny LED projector.

#### 3. Mirror:

The projection coming out from projector is reverts with the help of mirror. User can project it anywhere and change location of projection by tilt the mirror.

#### 4. Colour marker:

It is present at the tip of user's fingers marking with red, yellow, green and blue tape which helps the webcam to recognize the hands gesture. The arrangement and movement

of these markers are interpreted into gesture which acts as an interaction instruction for the projected application interfaces.

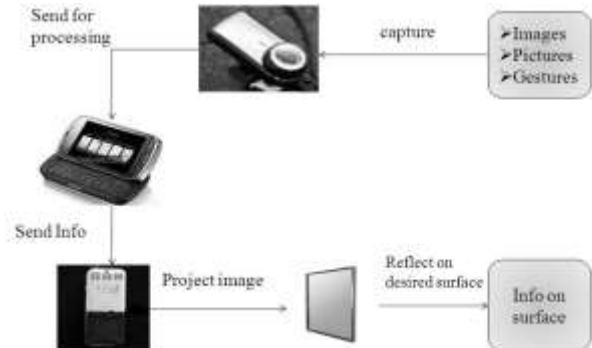
#### 5. Mobile Component:

It consists of internet-enabled smartphone as a processing device in user's pocket. The camera tracked the various gestures done by colour marker and given to mobile for further process. The software is run on the smartphone which support this technology and handle internet connection.

#### 6. Microphone:

Microphone is an optional component of sixth sense technology. When we use piece of paper as an interactive surface then he/she clips the microphone to the paper. It captures the sound signal of user's touching the paper. Then data is passed to computing device for processing. After that combined with the tracking information about user's finger, the system is able to identify the touch events on the paper.

### 4. WORKING



**Fig-4.1**

The basic hardware which makes Sixth Sense work is a pendant like mobile wearable interface. The working of sixth sense technology is based on various other technologies. The computer vision technique and the algorithms used in it helps the camera to detect/identify the objects. The camera also captures gestures and hand movements. To identify hand gestures colour markers are used which are covered over our finger tips.

The technique used for identifying these gestures is gesture recognition technique, where it recognizes the gestures using several numeric algorithms. There are also other neural network methods which generally helps it to detect the gestures whether it be facial (emotions) or hand gestures.

These gestures and streamed objects are considered as instructions. Further, as per the instructions the device will work. And the information needed is shared through the internet. The information is then projected on to wall or any surface. Then the users can interact with projected objects and also give further instructions.

## 5. APPLICATION

### 1. Make a Call:



By using Sixth sense, we can make a call without handling mobile. We can project a keypad onto our hand and use that keypad for making call. In this way, palm acts as a virtual keypad.

### 2. Call up a map:



Map application can provide the user to call any map of their choice and then navigate it on any physical surface with the help of thumb and index finger. For ex zoom in, zoom out and do other controls.

### 3. Taking a picture:



If we angle our index fingers and thumbs into a square which is typical “framing” gesture, then system will capture a photo. And after taking required number of photos, we can project them onto any surface, sort those photos using the gesture, and organise and resize them.

### 4. Book/Product Information:



The sixth sense technology provides amazon ratings of book, reviews, reader comments and relevant things related to book

which we are holding. Also provide the related information about the product we pick in our hand.

### 5. Flight Update:



It is no longer required to log into any site for checking the status of flight, sixth sense technology enables the user to receive regular updates regarding the fight by scanning the ticket.

### 6. Check Time:



By drawing circle on the wrist with our index finger, a hand watches cab be projected on the wrist which gives the correct time. The computer tracks the red marker, recognize the gesture and instruct the projector to project watch onto the wrist.

### 7. Create multimedia reading experience:



With the help of sixth sense technology, paper reading can be taken to the next level. The system recognizes the particular headline or picture of newspaper and project latest update and related video on that news event.

### 8. Information about people:



When you go out and meet someone, with the help of face recognition technique, the sixth sense technology provide related information about the people retrieved from the internet on the person’s body.

### 9. Drawing Application:



By tracking the fingertip movements of the user's index finger, this application allows user to draw on any surface.

## 6. ADVANTAGES

1. The device is portable.
2. Multi-touch and multi-user interaction.
3. Cost Effective.
4. Forming connection between real world and digital world.
5. Real time data access directly from machines.
6. Mind mapping.
7. Software is more open source.

## 7. DISADVANTAGES

Sixth sense technology has so many advantages despite few issues and drawbacks are still to be resolved as follows:

1. Excess use of a technology can affect the social life and can cause addiction as well. It will reduce humanness.
2. The projector runs on the battery which we have to replace.
3. We need to be always specific regarding our instruction.
4. The hardware market gets affected.

## 7. CONCLUSION

The key here is that Sixth Sense recognizes the objects around us, automatically. Information is displayed which let us access it in any way we want, in the simplest way possible. The /sixth sense prototype implements several applications that

demonstrate usefulness, viability and flexibility of the system. The potential of becoming the ultimate "transparent" use interface or information access about everything around us.

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