# Sixth Sense Technology

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*Abstract:* 'Sixth Sense' is a wearable gestural interface that augments the physical world around us with digital information and lets us use natural hand gestures to interact with that information. The device works on the principles of gestural recognition. Anybody who is equipped with sixth sense device can use its applications at any place and any time. The name Sixth Sense was given to this technology in light of a wearable device and the digital information could act in augmentation to the five traditional senses

Keywords: Camera, projector, mirror, microphone, color markers, gestures.

## I.    INTRODUCTION

Sixth Sense is a gesture based wearable computer system developed at MIT Media Lab by Steve Mann in 1994 and 1997 (head worn gestural interface), and 1998 (neck worn version), and further developed by Pranav Mistry (also at MIT Media Lab), in 2009, both of whom developed both hardware and software for both head worn and neck worn versions of it. It comprises a head worn or neck-worn pendant that contains both a data projector and camera. Head worn versions were built at MIT Media Lab in 1997 (by Mann) that combined cameras and illumination systems for interactive photographic art, and also included gesture recognition. The first archetype of the sixth sense was very much bigger and was not working properly to Use daily with a big projector mounted on a helmet but that proved cumbersome if someone was projecting data.

On to a wall and then turned to speak with a friend then data will project on friend face thus  Mistry switched up with a smaller projector and created the pendant prototype to be worn around the neck. The archetype was built from an ordinary webcam and a battery-powered 3M projector.



*Fig.1 Current Prototype of Sixth Sense*

The recent prototype consists of a smaller projector which looks like a pendant prototype that can be worn around the neck. The prototype consists of hardware components such as a pocket projector, camera and a mirror which are coupled to form a pendant-like wearable mobile device. This technology is a combination of computer and cell phone. This device is hanged around the neck and the projection is done by micro-projector that is attached to the device. In short time, you become a moving computer of your own and your fingers behave as the mouse as well as the keyboard.Parnav Mistry created the prototype with an ordinary webcam, an attached mirror and a battery-powered 3M projector – all of which is connected to a mobile phone that is internet enabled. The device is connected to the cloud. It uses a lot of search engine application program interfaces (APIs) like

Amazon APIs. While it connects you to the Internet world, it still enables to access all the dynamic information/data while you continue being in the physical world. It uses many of the software available on the Sixth Sense device and mobile phone. For example, it can take pictures without going to the Internet. It can save and modify pictures, zoom in, zoom out and do a lot more. The device is currently being evaluated by corporations including Google, Microsoft, HP and Samsung. Also, many small Indian companies, including some pharma companies from Hyderabad, have also shown interest in this project due to its wear ability. The 'sixth sense' hardware combines a mini-video projector, a webcam, a smart phone and some sensors, with a total cost of about $300 (£215) (approx Rs 17,000) to build.

## II. COMPONENTS

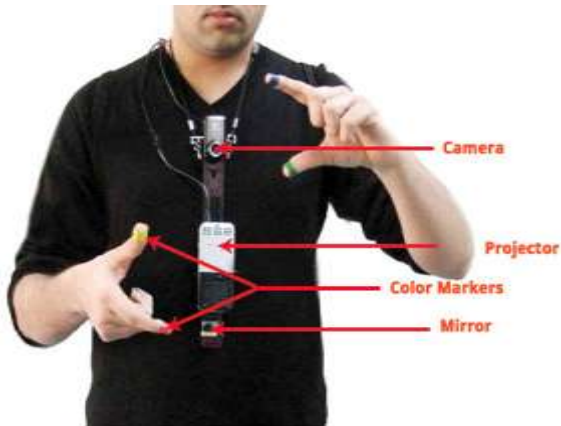The main components of Sixth Sense Device



*Fig.2 Components of sixth sense*

### A. Camera

A camera is acting as a digital eye, which sees everything the user sees. The camera is meant to capture and recognize objects in its view and does the tracking of user's hand gestures using techniques based on computer-vision. The camera tracks all the movements made by the thumbs as well as the index fingers of both the hands of the user. On recognizing the object, the camera sends the data to a smart phone for processing.

### B. Color Markers

The color markers that are red, green, blue and yellow are placed at the tips of the fingers which helps the camera to recognize the hand gestures. The various movements and structural arrangements made by these markers are interpreted as gestures that subsequently act as an instruction for the application interfaces that are projected.

### C. Mobile Component

The sixth sense setup consists of an internet-enabled smart phone which processes the data send from the camera. Smartphone is used to send and receive data and voice information from anywhere and to anyone through mobile internet. Software is run on the smart phone which supports this technology and handles data connection. The smart phone is meant to search the web and to interpret hand gestures. The camera, the projector and the microphone are connected to this device using wired or wireless connection.

### D. Projector

The projector is the key output device of the Sixth Sense system. A tiny LED projector displays data sent from smart phone on any surface. The projector itself comprises of batteries which have three hours of battery life. Basically projector Projects graphical user interface of the selected application onto surfaces or walls in front.

### E. Mirror

Mirror is placed just below the projector. Mirror reflects the projection coming out from the projector and thus helps in projecting onto the desired location on walls or surfaces. The user manually can change the tilt of the mirror to change the location of the projector. Thus the mirror in the sixth sense helps in overcoming the limitation of the limited projection space of the projector.

### F. Microphone

The microphone is an optional component of the Sixth Sense. It is require when using a paper as a computing interface. When the user wants to use a sheet of paper as an interactive surface, he or she clips the microphone to the paper.

## III. WORKING

Sixth sense basically works according to the gestures. The software recognizes 3 kinds of gestures.
- Multi touch gestures
- Freehand gestures
- Iconic gestures.
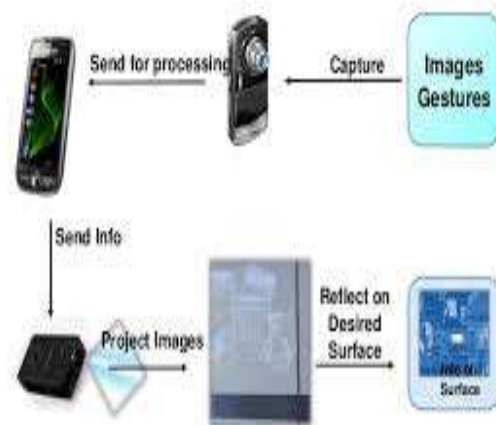


*(Fig. 3 working process of sixth sense)*

The camera recognizes individuals, images, pictures, gestures one makes with their hand then Information is sent to the Smartphone for processing. The downward facing projector projects the output image on to the mirror. Mirror reflects image on to the desired surface. Thus, digital information is freed from its confines and placed in the physical world.

## IV. VARIOUS APPLICATIONS

The applications of sixth sense technology are so wide. As already stated, devices with this technology is meant to bring the digital information to the physical real world thereby bridging the existing gap. The recent sixth sense prototype device has showed off its usefulness, flexibility and viability of this technology. The only limitation to this technology is human imagination. Some of the practical applications of this technology are as:

### A. Make a Call

With the help of sixth sense technology no mobile device will be required. You can use the sixth sense technology to project a keypad onto your hand. For this extend your hand on front of the projector and number will appear for you to click. Then use that virtual keypad to make a call.

### B. Taking Picture

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. If you fashion your index fingers and thumbs into a square(the typically "framing gestures" then the system will snap a photo(the typical "framing" gesture),After taking the desired number of photos, you can project them onto a surface, and use gestures to sort through the photos, and organize and resize them.

### C. Drawing Applications

This application allows the user to draw on any surface and the drawings are tracked by the movements of finger tips especially the index finger. These pictures can be stored and replaced to any other surface with ease. User with the help of hand gestures can do shuffling through available pictures. 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 '@' symbol lets the user check his mail.

### D. Time without watch

Watches are ancient history now with the prevalence of cell phones. With Sixth Sense user can draw a circle on their wrist with their index finger to get a virtual watch that gives us the correct time. The computer track the red marker piece of tape or cap, recognizes the gesture, and instructs the projector to flash the image of a watch onto his/her wrist.

### E. Multimedia Reading

We can see the more information with the help of sixth sense technology it is also possible to see the video related to news which we read through the newspaper. It searches the most appropriate video from the web by seeing the headline or the caption of the news report. A Newspaper can provide live video news or dynamic information can be provided on a regular piece of paper. Thus a piece of paper converted into a video display.

### F. Get product information

The true power of Sixth Sense lies on its potential to connect the real world with the Internet, and overlaying the information on the world itself. Imagine you are at the supermarket, thinking about what brand of soap is better. Or maybe what wine you should get for tonight's dinner. Just look at objects, hold them on your hands, and Sixth Sense will show you if it's good or bad, or if it fits your preferences or not. Similarly, if you pick up a book, the system can project Amazon ratings on that book, as well as reviews and other relevant information. Sixth sense technology uses marker technology or image recognition technique to recognize the object which we pick in our hand and provide information related to that product.

### G. Get Flight Updates

We can check the status of the flight. Suppose you can be in a taxi going to the airport, and just by taking out your boarding pass and place the boarding pass in front of the projector, Sixth Sense will grab real time information about your flight and display it over the ticket. The key here is that Sixth Sense recognizes the objects around you, displaying information automatically and letting you access it in anyway you want, in the simplest way possible.

## V. TECHNOLOGY IN SIXTH SENSE

### A. Gesture Recognition

It is a technology which is aimed at interpreting human gestures with the help of mathematical algorithms. Gesture recognition technique basically focuses on the emotion recognition from the face and hand gesture recognition. Gesture recognition technique enables humans to interact with computers in a more direct way without using any external interfacing devices. It can provide a much better alternative to text user interfaces and graphical user interface which requires the need of a keyboard or mouse to interact with the computer. An interface which solely depends on the gestures requires precise hand pose tracking. In the early versions of gesture recognition process special type of hand gloves which provide information about hand position orientation and flux of the fingers. In the Sixth Sense devices color bands are used for this purpose.

### B. Augmented Reality

Augmented reality (AR) is a term for a live direct or indirect view of a physical real world environment whose elements are augmented by virtual computer generated

imagery. It is related to a more general concept called mediated reality in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. The augmentation is conventionally in real time and in semantic context with environmental elements.

### C. Computer Vision

Computer Vision is the technology in which machines are able to interpret necessary information from an image. This technology includes various fields like image processing, image analysis and machine vision. It includes certain aspect of artificial intelligence techniques like pattern recognition.

### D. Radio frequency identification

It transmits the identity of an object wirelessly, using radio magnetic waves. The main purpose of this technology is to enable the transfer of a data via a portable device. This technology is widely used in the fields like asset tracking, supply chain management, manufacturing, payment system etc.

## VI. CONCLUSION

Sixth Sense is the science of tomorrow with the aim of connecting the digital world with the physical world seamlessly, eliminating hardware devices. This combination of hardware devices and software together create a reality in which the digital world is merged with the physical world. It facilitates easily learn information about products while shopping, find instructions while building or constructing and being able to easily identify areas while travelling are all extremely positive results of Sixth Sense technology. It is essentially a wearable computer that can surf the web, make phone calls and even connect to other computing devices. It is more portable and more interactive than any Smartphone, laptop or tablet available today. It allows for the user to easily record and photograph anything without being notice and it can also allow for the user to gain available online information about anything just by glancing at it and performing an online search. This will surely bring up many social, legal, ethical and security concerns. Sixth Sense technology is remarkable in its intended purpose for daily task efficiency and interactive computing.

## LITERATURE SURVEY

[1]VARUN ARORA KIT EATON stated that this technology's moving so fast it wouldn't surprise me to see some practical deployment of the "sixth sense" system in another 3 years. I'm sure all of us remember when hands free Bluetooth devices were New.

[2]**Jessica** on Aug 16, 2015 stated that Sixth Sense technology is really a future of our generation .Thanks to Pranav Mistry for this invention.

[3]praveenk@gmail.com on Dec 26, 2011 stated that Pranav, This is a great invention, probably among top 5 in history. Congratulations on that and thanks for making it open source.

[4]PrasMai@gmail.com on Dec 24, 2011 stated that If this has been completely done using Free Open source software and programming language like c / C++ / python etc. there is no software cost involved... when this project is let open source then why not it should be done using open source tools. If I could know under what license this has been released, Me and my team would port this technology completely using open source technologies and generic language which supports every operating system and not proprietary like C#. Thanks for letting the codes Open source.

[5]Outatim@googlemail.com Apr 3,2012 stated that it contain Nice projector BUT my guess is that the Aiptek-pocket-cinema-z20 will NOT work for the WUW because the device will only project the pictures and movies from it's own SD card and will not send out the "data" to a PC with the WUW software and then back to the projector. You can only send "data" to the projector.

[6]SHRUTHI VENU KUMAR stated that Sixth Sense technology is the science of tomorrow with the aim of connecting the digital world with the physical world seamlessly, eliminating hardware devices.

[7]PARNAV MISTRY stated that hardware-wise it is very simple. The plus point of hardware is they are cheap and are going smaller and smaller every month, leave alone a year.

[8]SNEHA ALLU stated that some of the health issues are regarding Sixth Sense's projection technology. Projection is better in the night time and dark areas rather than mornings. This is an issue because the vision of the user can be damaged due to this technology.

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[3]A Study on -The Sixth Sense Technology and Its Various Security Threats by Aakanksha Chopra1 and Natasha Narang2 Information Technology (IT), Affiliated to GGSIPU, Jagan Institute of Management Studies (JIMS) 3, Institutional Area, Rohini, Sector-5, New Delhi, INDIA.

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