

The Sixth Sense Technology

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Abstract- Sixth sense is a wearable gesture interface that augments the physical world around us with digital information and lets us use our natural hand gestures to interact with that information. Steve Mann is considered as father of sixth sense technology who made wearable computer in 1990. He implemented sixth sense technology as neck worn projector with camera system. Then his work was carried forward by Pranav Mistry (Ph.D student in the Fluid Interface Group at MIT Media Lab).

Sixth sense technology consist five components, namely camera, coloured marker, smart phone, projector and mirror. The camera and projector are coupled with smart phone which act as computer and connected to the cloud, all the information stored on the web. It project information onto surface, walls and physical object around us, and lets us interact with projected information through natural hand gesture.

Before the invention of sixth sense technology there is no link between digital devices and our interaction with physical world. Information is confined traditionally on paper or digitally on a screen. But Sixth sense bridge this gap, bringing intangible, digital information out into the tangible world, and allowing us to interact with this information via natural hand gestures. Sixth sense will allow us to interact with our world like never before. We can get information on anything we want from anywhere within few moment.

Keywords – component; formatting; style; styling; insert (key words)

I. INTRODUCTION

We've evolved over millions of years to sense the world around us. When we encounter something or someone we use our five natural senses, namely eye, ear, nose, tongue and mind to get information about it, that information helps us to make decisions and chose right action to take. But arguably the most useful information that can help us to make right decision is not naturally perceivable with our five senses, namely data, information and knowledge.

Although the minimization of computing device allows us to carry computer in our pocket and keeping us continually connected to digital world, there is no link between digital devices and physical world. Information is confined traditionally on paper or digitally on screen. Sixth sense bridge this gap, bringing intangible, digital information out into tangible world, and allow us to interact with this information via natural hand gestures [1].Sixth sense is a wearable gesture interface that append the physical world around us with digital information and lets us to use our natural hand gestures to interact with that information.

It was developed by Pranav Mistry a PhD student in Fluid interfaces Group at the MIT Media Lab. He says that the movies Minority Report and Robocop gave him inspiration to create this technology. This technology is similar to neck worn projector/camera system developed by Media Lab student Steve Mann. Sixth Sense will allow us to interact with our world like never before. We can get information on anything we want from anywhere within a few moments.one great part of the device is its ability to scan object and project out information regarding what you are looking at [2].

II. COMPONENTS

Sixth Sense Technology consists of following components.

1. Camera
2. Coloured Marker
3. Mobile Component.
4. Projector
5. Mirror

2.1 Camera –

Camera captures the image of the object and tracks the user's hand gesture. The camera recognizes image, picture, gestures that user made with his hand. The camera then sends this data to smart phone for processing.

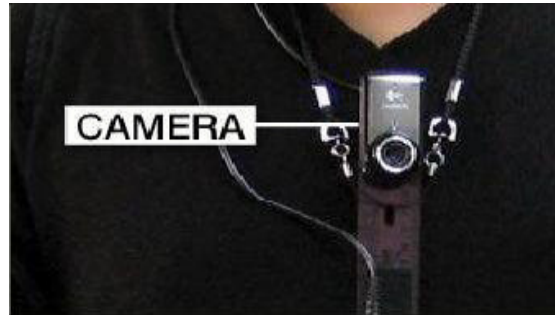


Figure 1. Camera [2]

2.2. Colored Marker –

There are four colour markers placed at tip of users fingers .Marker consist of red, yellow, blue and green colour. Coloured Marker helps camera to recognize user's hand gestures [1].



Figure 2. Coloured marker [2]

2.3. Mobile Component –

The sixth sense technology consists of web enabled smartphone which process data send by camera. The smart phone searches the web and interprets the hand gestures with the help of coloured markers placed at the finger tip.



Figure 3. Camera [2]

2.4. Projector –

The information that is interpreted through the smartphone can be projected into any surface. The projector itself consists of batteries which have 3 hour of battery life .A Tiny LED projector displays data sent from smartphone on any surface in view-object, wall or person. The downward facing projector project the image on mirror



Figure 4. Projector [2]

2.5. Mirror –

The usage of mirror is important as the projector dangles pointing downward from neck .The mirror reflect image on desired surface. Thus finally the digital image is freed from its confines and placed in physical world [1].

III. WORKING

The sixth sense technology works as follows.

- 1) Camera captures the image of object in view and tracks the user's hand gestures.
- 2) Camera sends this image to smartphone.
- 3) The smartphone searches the web and interprets the hand gestures with the help of coloured markers.
- 4) The information that is interpreted through the smartphone can be projected into any surface.
- 5) The mirror reflects the image on desired surface.

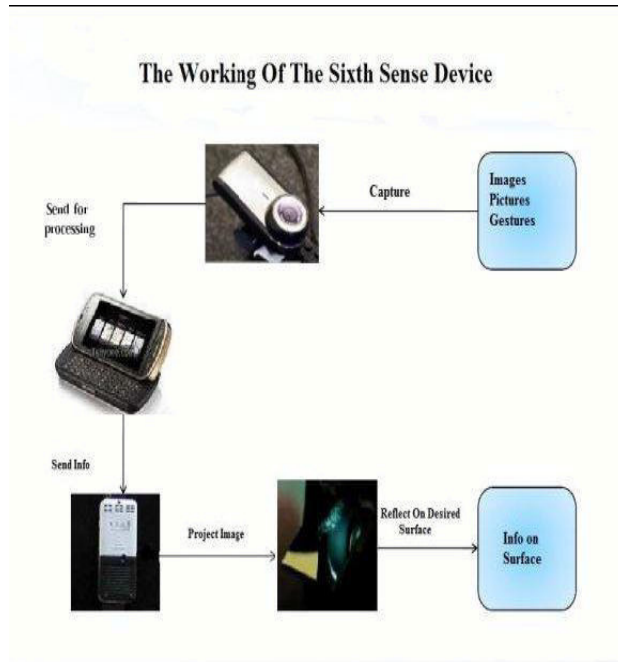


Figure 5. Working [2]

IV.APPLICATIONS

The Sixth Sense device has a huge number of applications. The following are few of the application of Sixth Sense Technology.

4.1. Viewing Map–

With the help of map application the user can call upon any map and navigate through them by projecting the map on to any surface. By using the thumb and index fingers movements the user can zoom in, zoom out or pan the selected map.

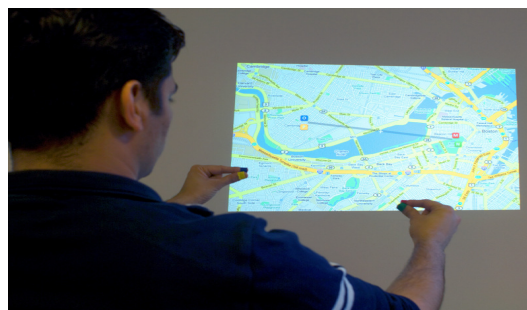


Figure 6. Map Viewing [5]

4.2. Tacking Picture –

The sixth sense technology consists of gestural camera. This camera takes the photo of location user is looking at by detecting the framing gesture. After taking desired number of photos we can project them onto any surface and then use gestures to sort through those photos and organize and resize them [1].



Figure 7. Tacking Picture [5]

4.3. Drawing Application –

The drawing application allow user to draw anything on any surface by tracking the fingertip movements of user's index finger. The pictures that are drawn by user can be stored and replaced on any other surface [3].



Figure 8. Drawing Application [5]

4.4. Making Calls –

The sixth sense device is used to protect the keyboard into user's palm and using virtual keypad we can make calls to anyone.

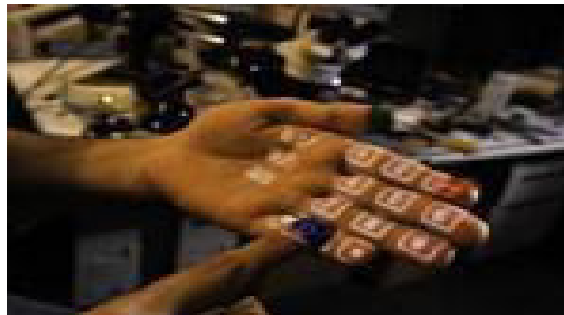


Figure 9. Making Calls [5]

4.5. Flight Updates –

The system will recognize the boarding pass and let you know your flight is on time or not and if the gate has changed [3].



Figure 10. Flight updates [5]

4.6. Check the time –

Sixth Sense all we have to do is draw a circle on our wrist with our index finger to get a virtual watch that gives us the correct time. The computer tracks the red marker cap or piece of tape, recognizes the gesture, and instruct the projector to flash the image of watch onto his wrist [5].



Figure 11. Check the time [5]

4.7. Checking email –

Sixth Sense allow user to draw icons and symbols in the air using the movement of index finger and recognizes those symbols as interaction instruction. For example drawing a “@” symbol lets the user check his mail [1].

V. ADVANTAGES

- 1) Sixth sense is portable and easy to carry as we can wear it in our neck.
- 2) The device could be used by anyone without even basic knowledge of keyboard and mouse.
- 3) Sixth sense is user friendly interface which integrates digital information into physical world.
- 4) It is an open source and cost effective.
- 5) If we are going for a holiday, then there is no need of camera to capture photos and from now on wards it will be easy to capture photos by using mere fingers [2].

VI. FUTURE ENHANCEMENT

- 1) Applying this technology in various fields like educational system, game development etc.
- 2) To get rid on Color markers.
- 3) To have 3D gesture tracking.

VII. RELATED TECHNOLOGIES

7.1. Computer Vision –

Computer vision is the technology in which machines are able to interpret/extract necessary information from an image. Computer vision technology includes various fields like image processing, image analysis and machine vision. It includes certain aspect of artificial intelligence techniques like pattern recognition. The machines which implement computer vision techniques requires image sensors which detect electromagnetic radiation which are usually in the form ultraviolet rays or light rays. The computer vision finds itself applicable in various fields of interest. One such field is bio medical image processing. It's also used in autonomous vehicles like SUV's.

7.2. 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 posing tracking. In the Sixth Sense devices coloured Marker are used for this purpose. Once hand pose has been captured the gestures can be recognised using different techniques. Neural network approaches or statistical templates are the common techniques used for the recognition purposes. This technique has an accuracy of more than 95%. Time dependent neural network will also be used for real time recognition of the gestures. Gestures can further be categorized according to their functionality.

a) Symbolic gesture:

These are gestures that, within each culture, have come to a single meaning. An Emblem such as the “Ok” gesture is one such example; however American Sign Language gestures also fall into this category. In Sixth Sense technology we use “@” symbol gesture to check the email.

b) Iconic gestures:

As the name suggests, these gestures are used to convey information about the size, shape or orientation of object of discourse. They are the gestures made when someone says “The plane flew like this”, while moving their hand through the air like the flight path of aircraft.

VIII. CONCLUSION

Before the invention of sixth sense technology there is no link between digital devices and our interaction with physical world. Information is confined traditionally on paper or digitally on a screen. But Sixth sense bridge this gap, bringing intangible, digital information out into the tangible world, and allowing us to interact with this information via natural hand gestures. Sixth sense will allow us to interact with our world like never before. We can get information on anything we want from anywhere within few moment.

Sixth sense is a technology that augments the physical world around us with digital information and lets us to use our natural hand gestures to interact with that information. Sixth sense technology has ability to scan objects or even people and project out information regarding what you are looking at.

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