Human Computer Interaction congregate with computer vision: A Review on Sixth Sense Technology

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Abstract—"Sixth Sense" is a wearable gestural interface that ameliorate the physical world around us with the digital information and allow us to use natural hand gestures to interact with the physical world. Data is available to us in an intangible form with the help of sixth sense technology we convert this data into tangible form. It provides a comprehensive way to interlink the physical and digital world using natural hand gestures only. The Sixth Sense Technology was discovered by Steve Mann and later on the proper modification was made by Pranav Mistry. He gives the new outlook and definition to the Sixth Sense device by relating it in such manner so that it can directly append with the people. Different applications have been discovered using the concept of Human Computer Interaction and Computer Vision. This paper discusses about the new era in the technology that will be soon developed revolution in the digital world which is known as Sixth Sense Technology.

Keywords— Gestural interface, Security Issues, Human-Computer Interaction, Computer Vision.

I. INTRODUCTION

Human being sense the world around them by using their five natural senses smell, hear, taste, see and feel to get any information or knowledge. Sixth sense is an extraordinary sense which works internally. In the same manner the Sixth Sense term is related to our technology also. The miniaturization of computing device making our task easier and faster. It keeps us continuously connected with the digital world but it does not provide link to connect with the physical and digital world together. The sixth sense Technology resolves this problem. The first prototype of Sixth Sense Technology was discovered in 1994 by Steve Mann based on head-worn and neck-worn mounted project. Later on Pranav Mistry had made the modification and gives the name "WEAR YOUR WORLD [1]. "Sixth Sense Technology identify the object around us and display information. It is based on wearable gestural interface consists camera, color markers, mirror and projector [2].

In this paper discussing about the concept of Sixth Sense Technology working, methodologies used, different applications and limitations. Sixth sense Technology is the growing technology these days so many research related work have been already done using the approach of Sixth Sense Technology. In this paper their few highlights about this technology.

Figure.1 In 1994 Head worn Sixth Sense Device [3]

Figure.2 Neck-worn Sixth Sense Device [3]

Sixth Sense Technology hardware components are encompassed like pendant shape. The software program has been used to record the video by the camera and tracks the object and location [6]. It is based on Computer Vision techniques. The number of gestures can be added according to the requirement. The components of Sixth Sense Technology can be modified according to the need and requirement of the user [7]. Sixth Sense Technology hardware components are encompassed like pendant shape. The software program has been used to record the video by the camera and tracks the object and location. It is based on Computer Vision techniques. The number of gestures can be added according to the requirement. The components of Sixth Sense Technology can be modified according to the need and requirement of the user.

II. WORKING PRINCIPLE

The components used in sixth sense technology are the camera, projector, mirror, projector and mobile computing device.

- The camera tracks the gestures and images and sends to the mobile computing device for processing.
- Mobile computing device process the information send by the digital camera and send it to the projector for projecting images.
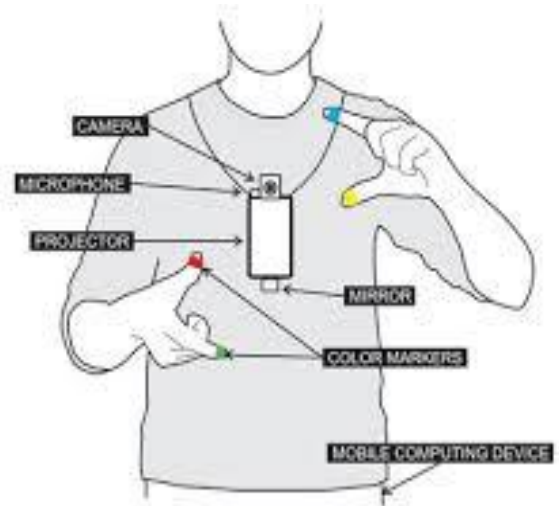- The projector projects the images by reflecting it with the help of the mirror to the desired surface [4].

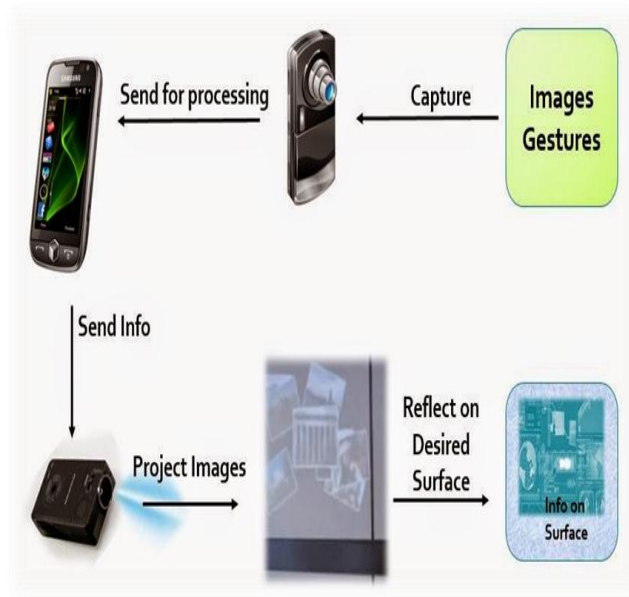

Figure.4 Sixth Sense Technology [8].

III. CONCOMITANT TECHNOLOGIES

- *Augmented Reality-* in the Augmented Reality world tells the difference what is real or what is computer generated. It provides an imagery path to augment with the virtual computer. The concept behind the Augmented Reality is to superimpose graphics with the real world environment [9].

Figure.3 Working of Sixth Sense Technology [5].

Figure.5 Augmented reality [10]

- ***Computer Vision-*** Computer Vision is termed as Technology and Science of machines. It is based on the approach of Artificial Intelligence to extract information from images [11].

Figure.6 Computer Vision [11]

- ***Gesture Recognition-*** It is used to track the human gestures with the help of Mathematical algorithms. The keyboard and mouse is used as medium between the human and computer. It is used to understand the human body languages, posture, proxemics and human nature [11].

Figure.7 Gesture Recognition [12]

- ***Voice Recognition-*** It is used to capture the human voice according to their voice modulation. Every person voice frequency is different from another. It is used to analyze the difference between different voices and works according to the store commands [13].

Figure.8 Voice recognition [14]

IV. APPLICATIONS

There are several applications of Sixth Sense Technology which are very useful to perform any task anytime anyplace.

- ***GPS tracking-*** It is used to track location of the place where we want to go just by the movement of hand gestures. For example, in real life when people struck in the traffic or didn't the exact location to go to the desired place then they just take out their mobile computing device to use the GPS tracker. With the help of Sixth Sense device people can easily use the GPS tracker to track the location and the place where they want to go by without taking out their mobile.

Figure.9 mapping location [15].

- *Calling Function-* This function is used to develop keypad on the hand itself to perform calling operation without taking out the phone. This application brings the phone into the hand.
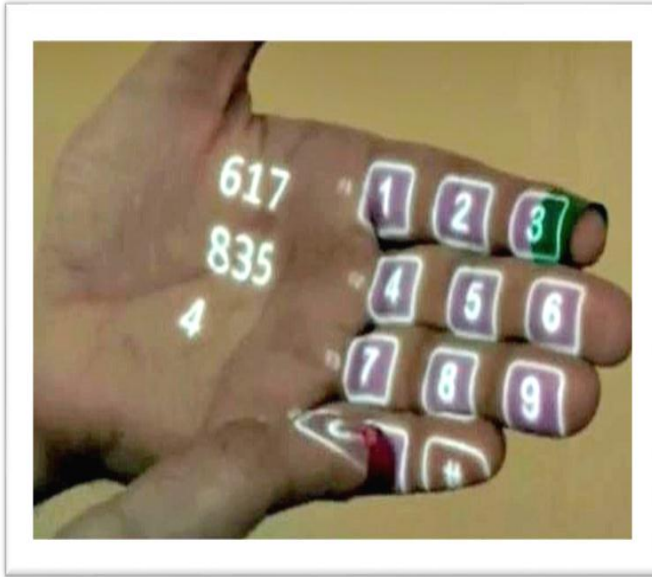

Fig.10 Gesture based calling [16].

- *Gaming-* It is the most amazing application in which we convert the plain paper into the video game and enjoy the gaming with the help of Sixth sense device. It brings our videogames into our hand and any surface to enjoy video games.

Fig.11 Sixth Sense Device based gaming [17]

- *Drawing-* With the help of this application we can convert any surface into the drawing canvas. We don't have to operate the mobile computing device or we don't need to have the drawing paper and color for it. The Sixth Sense Device helps us to draw at any surface with the help of gestures and the images will be automatically save in our mobile computing device [18].
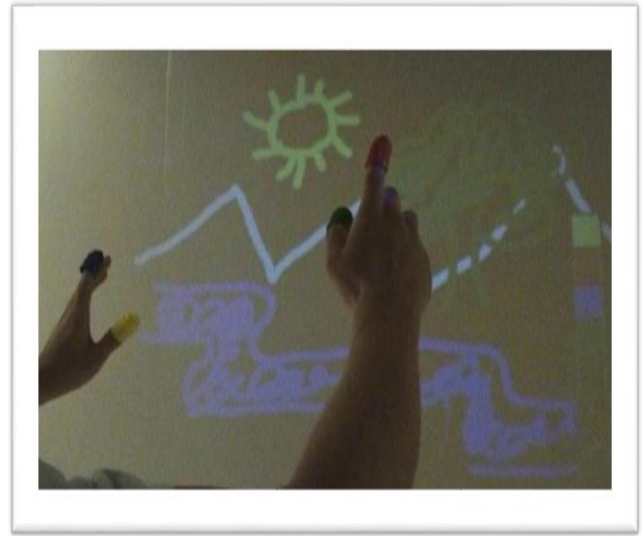

Figure.12 Drawing based on gestures [19].

V.   YET TO BE EXPLORED

There are lots of advantages of Sixth Sense Technology but in spite of its benefits there are lots of Security issues due to which it is not being manufactured for the public use.

- There is no privacy in the device, for example in the drawing application the user uses any surface as a canvas due to which it can be easily seen by others [20].
- Sixth Sense Device can be used as a Hacking tools for the Criminals to perform any illegal activity easily [21].
- Projection is better at night as compared to the daytime [22].
- There is no device security as it can be access by anyone so it can easily use as asset for Hackers [23].
- There is no security in the projection as in the Sixth Sense Device everything is projected in the desired surface so it can be easily seen by others, so it is required to have projection security.

VI. CONCLUSION

Sixth Sense Technology bring the rapid change in our Digital world. It provides an easier way to link the physical and digital world together. Earlier different kinds of work related to the Sixth Sense Technology approach have been developed like Google glasses, Invisible Mouse, SPARSH, etc. but the idea behind the development of Sixth Sense Technology has not been achieved completely. Sixth Sense Device will be very useful for the disable people because it works on gestures and can makes their living easy. It will bring revolutionary change for the betterment of the Society. But it is very important to work on the Security Concern associated with it, then only a powerful Sixth Sense device will be developed completely. It is required to add some advanced features and functionality according to the usage and need of the people than people can easily control and access the digital world easily anywhere anyplace.

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