A Study on -The Sixth Sense Technology and Its Various Security Threats

Aakanksha Chopra[1] And Natasha Narang[2]

Information Technology(IT), Affiliated to GGSIPU
[1,2] Assistant Professor (IT)
Jagan Institute of Management Studies (JIMS)3,
Institutional Area, Rohini, Sector-5, New Delhi, INDIA

ABSTARCT

The Sixth Sense 'An Extrasensory Perception' has turned into the new called 'The Sixth Sense Technology' which has emerged in few years. We all have evolved over millions of years to sense the world around us. We always make use of our five natural senses to perceive the information around us whenever we come across a thing, a person or a place. That information helps us make judgments and embrace the appropriate action to be taken. But arguably, the most useful information that can help us take the right decision and judgments is not naturally cognoscible information with the help of our five senses, namely the data, information and knowledge that mankind has amalgamated but, rather it's the 'Sixth Sense Technology.' This paper focuses on and makes us aware with the sixth sense technology which provides an integration of the digital world with the real world; it helps us understand how the sixth sense device had overpowered the five natural senses; it also pours light over its various applications, its security related issues and further implications.

Keywords: Digital World, Natural Hand Gestures, Sixth Sense Technology, Sixth Sense Device, Security Issues

1. INTRODUCTION
This '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. Although the reducing size of computing devices allows us to carry computers in our pockets, keeping us continuously connected with the digital world. There exist no intermediate link between our digital devices and our interactions with the physical world. Information is confined traditionally on paper or

digitally on a screen. Sixth Sense Device binds 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' frees information from its confines by seamlessly integrating it with reality, and thus making the entire world your computer. Sixth Sense allows people to use internet without a screen or a keyboard it actually acts itself as a computer and is connected to cloud. It has turned any surface into a touch screen.

By using a camera and a tiny projector mounted in a pendent like wearable device, 'Sixth Sense' sees what you see and visually augments any surface or objects we are interacting with. It projects information onto surfaces, walls and physical objects around us, and let us interacts with the projected information through natural hand gestures, arm movements, or our interaction with the object itself. The software program processes the video stream data captured by the camera and tracks the locations of the colored markers (that we wear on our fingers) using simple computer vision techniques. This paper helps us have knowledge of how the sixth sense device had vanquished the five natural senses. This paper makes us cognizant how the sixth sense technology provides an integration of the digital world with the real world. This paper focuses over various applications light over various security related issues and further implications. The theory behind Sixth Sense Technology is that the Sixth Sense Device tries to determine not only what someone is interacting with but also how he or she is interacting with it. The software searches the internet for the information that is relevant to that situation.

2. HISTORY

Pranav Mistry, of Indian origin, a PhD student in Fluid Interfaces Group at the MIT Media Lab is the mastermind behind the Sixth Sense technology. Pranav was inspired by the movies like "Robocop" and "Minority Report" which inspired him to create his view of a world not dominated by the computers, human robots and digital information rather build a technology with Human gestures which is portable enough to carry and to make the world more interactive and workflow much easier. Sixth Sense will allow us to interact with the world like never before. We can get any information anywhere within few moments and that took on a new level without any screen or computer hardware components. On great part of the device is its ability to scan objects or people and project out information regarding what you are looking for. The Sixth Sense technology was developed at media labs in MIT and termed as Wear Your World (WUW.)

3. WORKING

As we can see in Figure 3 that the camera captures the movement of moving colored markers on the user's finger tips when they move their hands. Camera and projector both are connected to the smart phone in user's pocket. Recognition is made using *Computer Vision Technique*. The software program processes this video stream data and interprets the movements into gestures. Each gesture is different from one another

and is assigned some commands. These gestures act as input to application which is projected by the projector. The mirror reflects the image formed by the projector to front. The projector projects visual images on a surface. This surface can be wall, table or even your hand. This technology is mainly based on hand gesture recognition, image capturing, processing and manipulation, etc.
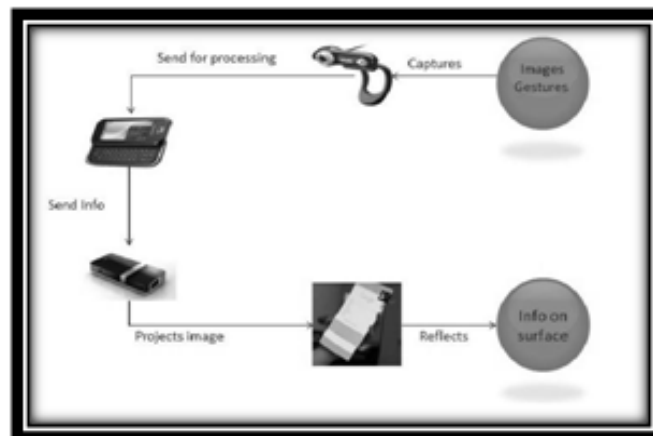

Figure 1 : The Sixth Sense Device

Figure 2: Working of Sixth Sense Device

The software recognizes following 3 kinds of gestures:
- *Multi-touch Gestures:* where we touch an image like a map and make it move by pinching & dragging.
- *Iconic Gestures:* like drawing a star in the air with fingers and it shows me weather. Or drawing a circle on my wrist and it shows me watch.
- *Freehand Gestures:* all the gestures done with free hands like clicking a picture in the air and it projects that picture on any surface.

4. VARIOUS APPLICATIONS

There are various applications of Sixth Sense that exhibits the efficiency, viability and flaccidity of the system.

4.1 Make a Call: This technology enables the user to call without using the dialer. The dialer will be projected as soon as user brings the palm in front of the device. The user does not need a mobile phone to make the call rather the virtual keypad it projected on the palm.

4.2 *Get Flight Updates:* The device can also tell the user whether the flight is delayed or is on time by looking at the ticket.

4.3 The Map: The map application allow the user to navigate a map that displayed on a nearby surface by using our hand gestures, which is similar to the gestures supported by Multi-Touch based systems, permitting the user to zoom in, zoom out or pan using intuitive hand movements.

4.4 3D Drawing Application: The drawing application of this device lets the user draw on any surface by tracking the tips movements of the user's index finger.

4.5 The Clock: The user just needs to make a gesture of a circle on the wrist and the clock with current time will be projected on the user's hand.

4.6 Motion Capture: Using fingers the user can capture photos and no need to carry an extra gadget. The box created by fingers act as a frame. These photos can be edited also or shared with people.

4.7 Video Newspapers: This device also recognizes articles in the newspaper, retrieve the latest related stories or video stream from the internet and then display them on pages for user. It had said goodbye to "dictionary and encyclopedia."

4.8 Book Information: for book lovers it had proved to be a blessing as you just open any book and find the ratings of the book, also move to any page and get additional information. Similarly, we can find information about any product also.

5. VARIOUS SECURITY THREATS

Every technology available in the market and in process faces some severe security threats. With sixth sense device also there are some security concerns due to which it is still not in the market. There are several Cyberwarfare with Sixth Sense. Cyberwarfare also known as Cyber War are any virtual conflict initiated to attack on enemy's computer and information system.

Through Internet, these attacks disable financial and organizational systems by stealing or altering classified data to undetermined network websites and services. It leads to military and financial computer systems at risk and Security breaches. There

are some weaknesses in the device that can reduce the accuracy of the data.

Let us study in depth all the security issues:

- *No Privacy:* When a person is taking a picture using Sixth Sense, he just snaps with his fingers without even intimating or informing the person or thing being clicked. Person can never tell that a sixth sense device is taking a picture as picture can just be captured by hand gestures and the device is also not that big. Also people don't want to be captured on a camera of any random person. This is invading other's privacy which can be a huge problem.

- *Intelligence opening doors for criminals:* This device can help in collecting amazing amount of information without getting caught or being tagged as a suspicious person. Like when the person having this device enters any office or building can use "PICTURE" application to collect all the relative and secret information about that office or building. Secondly, when it comes to OSINT it is endless. OSINT stands for Open Source INTelligence; that is collected from Publically available sources. By using the "Facebook Face" database to recognize people on the streets; knowing what they do, where they live, where the work, how much they earn, etc. All the personal information can be extracted. This will definitely open lot of doors for criminals also.

- *Tool for Hackers:* A hacker could use this device to attack an online environment using functions on the device to break in building. It can lead to Hacktivism which is closer to cyberterrorism. *Hacktivism* can be understood as an activity that is malicious, destructive, and undermining the security of the Internet as a technical, economic and political platform. Hackers or Hacktivist will use this device as a weapon to feed or can provide information to Hacktivist army.

- *Cyber Security:* Sixth Sense Device could actually be a real trouble if one can communicate and share information with other Sixth Sense devices then it means one can manipulate them and infect them with malware. Malwares are software used to disrupt computer operation, gather sensitive information or gain access to private computer system. It can change credentials, steal credentials, Provide wrong information or wrong agenda.

- *Health Issues:* When the device is projecting on hard surface, it is not private only for the user using it rather people around him can see the projection very easily since it is very definite and exact. As we all know that projection is better at night time and dark areas than morning and bright areas. This is a bigger issue from health prospective that vision of the user can be damaged. The device should be able to shift its projection techniques during different times of the day.

Sixth Sense could be used as a weapon of mass destruction also. We cannot use it in Medical Environment. Though this device will allow us to recognize people but it is an infringement on our privacy. Pranav Mistry is trying to overcome these security threats. Pranav Mistry said-"This prototype needs some serious engineering and programming."

6. FUTURE ENHANCEMENTS

As this technology will emanate may be new devices and new technologies based on it will also come up. Sixth Sense Device is completely different from the computers as it enables one to compute and browse on any surface that we can find around. The foremost thing is to overcome all the security threats discussed in previous section; as many new technologies came and died due to security issues and threats. Secondly, to get rid of the color markers and integrate camera and projector inside the mobile computing device itself. Thirdly, implementing this technology in various areas like gamming, education system etc. Fourthly, there can be a 3D gesture tracking as in MS Kinect device. Fifthly, in this world of smart phones where smart phone as available at cheaper prices with more features Pranav should try to reduce its actual cost from $350. Lastly, and the most essential which can be benefit for the society also to make sixth sense work as fifth sense for disabled people.

7. CONCLUSION

The Sixth Sense is developed to seamlessly integrate information into real world. The future may depend upon the Sixth Sense. It can contribute an easy control over machineries and equipment's in industry. Hence, it can help in enrooting diverse applications for different developers and engineers upon how they imagine, innovate, what's their need and how they want. So, considering its widespread applications the inventor has decided to make it open source so it can be called as open source software. This technology can be a replacement of the 5th sense for differently abled people. This technology will bring a drastic change in the field of Science and technology.

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