

Sixth Sense Technology and Its New Applications

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Abstract—

During the attention at a new object our senses try to sense and analyze that particular object and make us interact with them. But to know the complete information about a particular object we should go through it in detail by surfing on net or asking the relevant person for information. Instead, sixth sense technology can be used to immediately trace out the whole information about an object as soon as we see it. In this paper, we tried to design an application for sixth sense enabled college. This application can be used by the administration to know about the academic qualifications of a particular student, student can also know about the upcoming events and other information from notice boards without actually physically being present near the notice board. Anyone can get the review of a book and its availability in the library. Background work for Sixth sense technology, its applications, advantages and its future scope is also presented in this paper.

Keywords— Sixth Sense Technology, Gesture recognition, Evolution, Cloud computing, Applications.

I. INTRODUCTION

Computers started to rule the mankind from many centuries. People began to use them for many purposes and later they found place in almost every area like offices, hospitals, educational institutions, super markets house hold etc. Many types of software have come up enabling us to do our task in an easier way. For each and every work we do we began depending on computers for example booking an online ticket, paying telephone bills, online shopping etc. People began to work like machines in front of machines. As the time passes many things have changed and many new things have come into limelight and computers are no such exceptions. Many scientists are trying to develop a technology to integrate the physical world with the digital world. Humans have 5 senses namely Eyes, ears, nose, tongue and skin which perform their own function i.e. eyes for seeing, ears for listening, tongue for tasting, skin for touching and nose for smelling. As shown in Fig 1. There could be another sense which would enable us to sense things that are not basic and biological. In order to get to know about many things we take the help of internet but with the advent of a technology to integrate the physical world with the digital world a technology is proposed which would enable us to sense things that are not basic and biological can be assumed as sixth sense technology

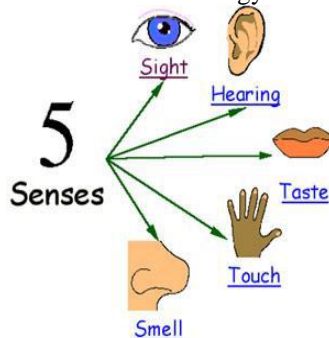


Fig 1: Five senses of humans

Sixth sense technology can make the entire world as a computer via hand gestures. It can be used in colleges, supermarkets, schools, map navigator, jewellery shops etc. Using hand gestures we can zoom in, zoom out or pan like any other multi touch system does. Sixth sense technology can be used to check the quality of a particular object, directions to particular destination, etc. Augmented reality [4] is the concept which bridges between physical world and digital world. Augmented reality combines virtual world with the real world, even the fictitious world can be experienced. The concept of augmented reality can be combined with sixth sense in order to have better gadgets that make us machine free. With the advent of sixth sense technology, if it can have its roots into all the fields we can expect things to happen in a much better way.

II. SIXTH SENSE TECHNOLOGY

We know, previously many technologies evolved such as augmented reality where the superimposition of graphics, audio, and other enhancements were used. Unlike virtual reality, augmented reality does not create a simulation of reality instead it blurs the line to show the difference between what's real and what's computer generated by enhancing five senses. In simple words, augmented reality [4] is changing the way our world is viewed and sixth sense technology is making it appear in real.

Initially Steve Mann developed a neck worn projector with a camera for implementing sixth sense technology. Later, Pattie Maes and Pranav Mistry carried his work and developed a augmented-system which they call Sixth Sense, presented in TED conference [4]. The Sixth Sense device makes any plane surface as an interface with which we can interact physically. The Sixth Sense prototype is a wearable gestural interface that augments the physical world around us with the digital information. The sixth sense prototype is made using very common and easily available equipments like pocket projector, a mirror, mobile components, coloured caps and a camera as shown in Fig 2. The projector and camera are connected to a smart phone via blue tooth. Natural hand gestures are used to interact with the digital data.

III. 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. Gender 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 coloured bands 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 commonly used techniques used for the recognition purposes. This technique has a high accuracy usually showing accuracy of more than 95%. Time dependent neural network will also be used for real time recognition of the gestures

IV. SIXTH SENSE PROTOTYPE

In the sixth sense technology, the uses of various equipments mentioned above are Camera to capture the image of the object which is found in its view and it can be considered as digital eye.



Fig 2: Motion Capture [4]

Projector is to project the visual information on to the surfaces and objects making them as physical interfaces. Mirror is used to adjust the angle between the projector and the screen. It reflects the rays coming from the projector on to the screen. A smart phone which is enabled with access to Internet is used in order to process the video data. Coloured Caps are placed at the tip of users fingers. They are marked with red, yellow, green and blue tapes. These help the camera to recognize the gestures. All these hardware components are coupled in a pendent. [3] [6] [2] Gesture recognition [1] is a term used to interpret the gestures through mathematical algorithms and mathematical gestures. Gesture recognition can be seen as a way for computers to understand human body language, thus building a bridge between machines and humans than primitive text user interfaces. Gesture recognition can be conducted with techniques from computer vision and image processing. Computer vision is the science and technology of machines that is concerned with the theory behind artificial systems that extract information from images. In Sixth Sense technology, gesture recognition was considered in order to understand the motion of fingers.

V. ADVANTAGES OF SIXTH SENSE TECHNOLOGY

Sixth sense technology features a user guide that makes it simple to use. There are important gestures using which people can easily learn without going through tutorials. There are various advantages of Sixth Sense Technology.

Capture Photos

In order to snap a picture, the user has to make a rectangle in air as shown in Fig 3. The picture will be taken and it will be placed in memory card. A person can resize and edit it whenever needed by projecting it on any hard surface like wall. [4]



Fig 3: Capturing images [6]

Mobile Phone Dialer

Sixth sense can be added to our cell phones. Instead of carrying a cell phone in hand, a person can project the keypad on his palms and make calls just by touching the digital keys and press the keys as done in mobile phone. There will not be any limitation for screen and any medium can become an output medium [3]. Sixth sense in other words will bring the digital and real world together.

Reading Books

In library, a person can easily check whether a particular book is interesting or not based on the rating and reviews of the book which is viewed as soon as the book is opened.[4] This makes things easier and time efficient. People can easily decide whether to go for that book or look for another book.

Video Newspaper

Instead of reading a newspaper [4] which has static images a person can view a video regarding particular news as shown in Fig 4. In this case, Sixth Sense pulled up a video online about the same news that is published in the newspaper. This device can be used easily by all the people because it uses hand gestures which everyone uses in daily life.



Fig 4: Video Newspaper [2]

Quality Check

In shopping malls, one can easily check the quality of food they are about to buy, quality and reviews of other products they wish to buy. This process reduces the customer-complaints list in the malls hence increasing the profits.

VI. VARIOUS APPLICATIONS

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

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.



Fig 5: Phone Call

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.

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.

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."

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.

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



Fig 6: Flight Enquiry

VII. 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 Cyber warfares with Sixth Sense. Cyber warfare 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.

A Study on -The Sixth Sense Technology and Its Various Security Threats 667 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 they 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 cyber terrorism. 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."

VIII. 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 gaming, 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.

IX. CONCLUSIONS

Sixth Sense Technology recognizes the objects around us and makes us interact with the information in any way we need without the use of microelectronic gadgets using simple hand gestures. It can be used as 5th sense for handicapped people. Individuals can make their own applications according to their need. Sixth sense technology clearly became a

transparent user interface thus making life easier. As technology changes, many devices hit the market and leave soon if they are not efficient. The security reasons are to be considered while using sixth sense technology. Authorised access to an application plays a major role. For instance, while using this sixth sense technology in libraries, there should be a separate method for faculty and students to access them as it may lead to hoax. Sixth sense technology is very different from other devices and is a new topic for hackers and other people. We got rid of coloured markers in recent years. However, we should try to make it more secure and avoid radio waves which are harmful and could cause brain cancer to children. Camera and projector can be incorporated into a mobile device than using them separately.

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