

Breakthroughs and issues in the implementation of Six Sense Technology: A review

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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. Sixth Sense technology is a revolutionary way to interface the physical world with digital information. 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. This paper focuses on and makes us aware with the sixth sense technology which provides an integration of the digital world with the physical world; it helps us understand how the sixth sense device had overpowered the five natural senses; it also pours light over its various applications, advantages, disadvantages and its security related issues and further implications.

Keywords-Artificial Intelligence, wearable, digital information, gestures, security.

Evolution

[1]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 (e.g. finger-tracking using colored tape on the fingers) Sixth Sense is a name for extra information supplied by a wearable computer, such as the device called EyeTap (Mann), Telepointer (Mann), and "WuW" (Wear yoUr World) by Pranav Mistry.

Why to discover Six Sense technology? [2] Basically humans take decisions after acquiring inputs from the senses. But the information is not sufficient in humans than its effect to the right decisions. But in this time with the help of Internet, we collect a huge number of information which making a good decision on a few minutes. This six sense technology provides us with the freedom of interacting with digital world with hand gestures. This technology has a wide application in the field of Artificial Intelligence. This methodology can aid in synthesis of bots that will be able to interact with humans.

Introduction

[3]Artificial intelligence is a human endeavor to create a non-organic machine-based entity that has all the above abilities of natural organic intelligence. Artificial Intelligence in the form of expert systems and neural networks have applications in every field of human endeavor as Heavy Industries and Space Finance, Computer Science, Aviation, Weather Forecast, Swarm Intelligence

and sixth sense technology. Sixth sense technology has integrated the real world objects with digital world. The fabulous 6th sense technology is a blend of many exquisite technologies. Sixth Sense is a wearable gestural interface that enhances the physical world around us with digital information and lets us use natural hand gestures to interact with that information.

The Sixth Sense 'An Extrasensory Perception' has turned into the new called 'The Sixth Sense Technology' which has emerged in few years. Sixth Sense Technology is a mini-projector coupled with a camera and a cell phone—which 'acts as the computer and connected to the Cloud, all the information stored on the web. In this time we have seen lots of technology devices which are mind blowing inventions for humans. As a latest technology called Six Sense technology. Six sense technology is a kind of device which does not need to carry any heavy technology device such as camera, watch & computers etc. Here if we have to take picture of any beautiful things or any things then we do not need a camera.

Six sense technology is a new and interesting type of technology, which is easiest using for all type of people. The main factor of six sense devices is the distance, distance between the gesture and camera neither very large nor very small. This technology is all about interacting to the digital world in most efficient and direct way. Human has many type of senses to perceive the information around us whenever we come across a thing, a person or a place. That information helps us make judgment 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.'

Design and Working

[4]The sixth sense device comprises of :

1. Wearable projector
2. Mobile device
3. Speech IC
4. Mirror

The sixth sense device is a mini projector coupled with a speech IC and a cellphone, which acts as a computer and our connection to the cloud, all the information stored on the web. The components are controlled by or communicated with a mobile computing device carried in the user's pocket. The hardware components are coupled in a pendant like mobile wearable device .Both the speech IC and the projector are connected to the mobile computing device in the user's pocket. The projector, projects the visual information enabling surfaces, walls and physical objects around the user to be used as interfaces. While the speech IC stores commands which were trained by the user and executes the corresponding action through the projector, enabling the actions from the mobile device. A remote computer can also be connected which gathers data from user ,processes it, searches the web for relevant execution of the command and returns the result in real time to the user. The speech IC is trained with regularly used operating data and thus it acts as a database for storing all such commands. There evolved many speech integrated circuits with fabulous technical aspects to be embedded for vast kind of applications.

There are three ways for speech recognition and language understanding.

- 1)Multipurpose processors intended for embedded applications.
- 2) Customized integrated circuits for speech recognition and language understanding.
- 3)Implementing speech recognition and language understanding as part of larger integrated circuit in the device.

Some integrated circuits can be used for less than 15 words, which have a menu based type of interaction whereas other ASIC integrated circuits can be used for hundreds of words which possess natural language understanding. The IC will be trained with a sophisticated neural network to recognize the commands and activate it correspondingly. The speech IC is initially trained with the words or commands .The user gives the input as commands and when such analog speech is received to the IC ,the data is converted into digital and is sent to the mobile device .The mobile device activates the command and is given in turn to the projector. The projector output is seen on the screen through the mirror for accurate projection from the projector which is wearable in the body. For more advanced operations and for accessing net which is our future work, can be accessed from the remote computer simultaneously and projected as before.

Software Used

Software program processes the video stream data captured by the camera, the Sixth Sense software will be open source. As far as this seems to be a little set of items, there will not be user interfaces or much advanced programs for the users. There will be much harder and secured coding inside the device to make sure the security of the software. It will be interesting to know the new language for coding for a Sixth

Sense device, as for as this seems to be a little set of items there will not be user interfaces or much advances program for the users. There will be much harder & secured coding inside the device to make sure the security of the software. The prototype system runs on windows platform & majority of the code is written in C++ & C#. Uploading newer versions as it is being developed this will also include a mobile version.

Applications

[5] The Sixth Sense prototype implements several applications that demonstrate the usefulness, viability and flexibility of the system. The Sixth Sense device has a huge number of applications. The following are few of the applications of Sixth Sense Technology:

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.
2. 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.
3. 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. 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.
5. 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.
6. 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."
7. 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.
8. Get Flight Updates: The device can also tell the user whether the flight is delayed or is on time by looking at the ticket

Upcoming Projects

The upcoming projects making use of sixth sense technology are [3]:

Mouse less -Mouse less is a concept which is developed in order to avoid the usage of mouse in computers. It helps to provide a familiarity of the physical mouse without actually requiring a physical mouse. Even through the computer hardware technology has been developed to a greater extent, still there has been no proper substitute for a physical mouse. This new invention aims to remove the requirement of having a physical mouse altogether but still it provides the feeling of a physical mouse that users are familiar with. It basically consists of an infrared laser beam and infrared camera. Both laser and camera are embedded together with computer. The laser beam module is modified with a line

cap and placed such that it creates a plane of IR laser just above the surface the computer sits on. The user cups their hand, as if a physical mouse was present underneath, and the laser beam lights up the hand which is in contact with the surface. The IR camera detects those bright IR blobs using computer vision. The change in the position and arrangements of these blobs are interpreted as mouse cursor movement and mouse clicks.

Third eye-Third eye is new technology that enables multiple viewers to see different things on a same display screen at the same time. With third eye, we can have a public sign board where a Japanese tourist sees all the instructions in Japanese and an American in English. We don't need to have the split screen in games now. Each player can see his/her personal view of game on the TV screen. Two people watching TV can watch their favorite channel on a single TV. Screen. A public display can show secret messages or patterns. In the same movie theatre, people can see different end of suspense movie.

Inktuitive -Even though there has been a tremendous development of computer aided designing tools, still paper and pencil is the preferred by most of designers, especially in the earlier stages of designing. The project 'inkuitive' is aimed to combine the process of creation that is inherent in paper and pencil with the power of computing that the digital design tools provide. It also extends the natural work-practice of using physical paper by giving the pen the ability to control the design in physical three-dimensional space, freeing it from its tie to the paper. There always remains an intuition of pen and paper, but the lines that have been drawn are captured and translated into shapes in the digital strokes. The platform provides a novel interaction mechanism for drawing and designing using above the surface pen movements. In other words 'inkuitive' can be considered as an intuitive physical design workspace that aims to bridge the gap and bring together the conventional design tools such as paper and pencil with the power and convenience of the digital tool for design.

TaPuma-TaPuMa is the short form of tangible public map. It is another attempt to bring the digital world nearer to the real world by exploring the techniques of six sense technology. Key word based search mechanism has vastly influenced and modified the ways in which we search information. The keyword based search allows the user to filter out the required data from the vast data that are available on search engines such as yahoo and Google. TaPuMa allows people to use their own belongings, the objects they usually carry with them to access relevant and just-in-time information and locations of places from a public map. The project also explores and analyzes the advantages and challenges of this novel interface for information acquirement. The broad concept behind the project TaPuMa is objects Amelioration, where the functions of everyday objects can be expanded by using their affordances or functionalities in a variety of different contexts.

Advantages

[6]The digital information and its objects are integrated into the physical world by using the Sixth sense interface, thereby making the entire world as our own computer. Sixth Sense makes machines like computers to adapt.

1 To human needs and not the other way round. Hand gestures are used to communicate with digital.

2 Information, multi-touch and multi-user interaction are also supported. Data from machine is directly accessed into real time.

3 It is open source and it is cost effective and map idea can be minded anywhere. Our relevant information is provided by the gesture controlled.

4 Wearable computing device that manipulates any surface into a display. It is portable

5 Comparatively easy to carry as can be worn in our

6 Neck even a naïve man with little or no knowledge of

7 Mouse and computer can use this device. Need to carry a camera no longer persist.

8 The cost that arose for the making of the sixth sense

9 Technology proto type is exceptionally low. A basic sixth sense device sums up to \$300.

Disadvantages

Inspite of so many advantages of Six Sense Technology; few drawbacks and issues are still to be resolved, which are as follows [6]:

1 .Excessive use of a technology can cause addiction and can hamper social life as well. It will in-turn diminish humanness.

2. Exposure of rays on surfaces like human arms can lead to health problems.

3. This technology will affect the hardware market and will result in less revenue being generated and lower the cash inflow.

4 It can affect the vision of the user because of its peculiar and better use at night time and in dark areas as compared to mornings and bright places.

Various Security threats

Every technology available in the market and in process faces some severe security threats. [7] 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 are some weaknesses in the device that can reduce the accuracy of the data.

Let us study in depth all the security issues:

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

Conclusion

Sixth Sense Technology is the most popular and current application of AI and it has endless applications. This can be used as a replacement of the five senses for handicapped people. This can provide easy control over machineries in industry. This will have different application for different developers, just depending upon how they imagine and what they want. This Software can be made open source, so that individuals can make their own application depending upon their needs and imagination. But at the same time this prototype needs some serious engineering and programming. The most important issue is to provide the security for the Sixth Sense applications and devices. As this technology will emerge may be new devices and hence forth new markets will evolve.

References

- [1] <https://en.wikipedia.org/wiki/SixthSense>
- [2] International Journal of Computational Science and Information Technology (IJCSITY) Vol.4, No.1, February 2016 Virtual Connection between Digital and Physical World based on Sixth Sense Technology
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[3] International Journal of Emerging Trends & Technology in Computer Science (IJETTCS)

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[4] International Journal of Scientific and Research Publications, Volume 5, Issue 5, May 2015 Sixth Sense Technology & Its Applications

Ranjeet Daroga*, Nishanraj Pandey**

[5] International Journal of Emerging Trends & Technology in Computer Science

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[6] International Journal of Science and Research Volume 4 Issue 6, June 2015

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[7] International Journal of Emerging Research in Management & Technology (Volume-4, Issue-5)

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