Comprehension and Intuition of the Sixth Sense Technology: A Survey Based Case Study of Pakistan

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Abstract: This paper emphasize on the sixth sense technology which is estimated to be blowout worldwide in upcoming year. It is one of the latest technology which helps to tie the physical world with the digital world. Sixth Sense technology is a technology by means of which a system could be taught to distinguish and percept, and act in response as preferred in the real world objects.

To conduct the study a set of survey questions have been prepared and distributed among participants of selected groups. Therefore the result has been evaluated based on the pros and cons of the latest technology.

Researches have been made on this latest and most breathtaking technology which is thus far to be publicizing in the market. Distinctive realization methodology and the potential applications and prospect of such technology is under considerations.

Keywords: Sixth Sense Technology, Augmented Reality, Computer Vision, Human-Computer Interaction, Image, Evolution, Applications, WUW, Gesture Recognition, mobile device, RFID.

1. INTRODUCTION

To make impossible things possible is no more a fantasy due to the advancement in technology on daily basis. Technology made every past impossibility possible in the present and expected to proof in upcoming year.

It is also observed that the use of technology by which humans try to change the nature according to the desires and requirements. The development of technology has made people astonished everyday having been an intricate assignments for individuals to be acquainted with to perceive what is approaching after that. There is not a particular discipline or segment that is not embraced by the technology.

This paper has focused on the most discussed topic of today's era the Sixth sense technology.

This is one of the leading topics today. Sixth sense technology has converted the meaning of word impossible by making things possible. It is one of the researchers debate to find all the possibilities, assumptions and claims of sixth sense technology because sill so many door are yet to open in this field.

The subject matter itself is very fascinating, enlightening the actual and realistic importance of Sixth sense technology and the exploration of this subject matter is the focal intention of this paper.

One of the reason to choose this technology is to get an idea of how this technology progressing and by what means is it approaching to make acquaintance with people and the surroundings.

The study was done and survey was conducted in Karachi city of Pakistan. As the survey was in progress to find the answers, the concept of Sixth sense device was established which shaped more reservation and inquisitiveness.

This paper is based on the survey conducted among selected group of participant. The surveyed was conducted between samples of 220 participants. The questionnaire was made keeping numerous factors in mind to show the importance and usability and future need of this technology.

In Session 2.0 and its subparts will cover the background and literature review. The designer, developer and the functionality of the device will be discussed in that session.

In session 3.0, first of its kind sixth sense devices, accessible from earlier period and the contemporary prototypes will be elucidated.

Session four, will be about the requirements of WuW followed by session five and six on the perception and technologies at the back of WUW along with the insight of the essential topics are discussed. The propose evaluation of the paper as well as the development progress based on questionnaire in the scenario as the case may be is discussed in session seven.

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2. BACK GROUND AND LITERATURE REVIEW

2.1. Technology and Sixth Sense

We all are growing up by taking this concept that a normal user has five senses by which we can interact with the world. But the theory behind sixth sense is comparatively a very unique idea for any human. This idea is used to transform the interaction of a user with the environment.

Computing devices are most definitely connecting people with the digital world. But the demand of the human has been changed from just being connected to the digital world to the real world by means of sixth sense technology. But now to a certain extent, the claim is to channel the gap.

The progressive development and the variations in the field of technology has been helping people throughout in their daily lives and making their lives better and bringing new hope every day for a better future. This is undoubted that the ongoing advancement in technology has been rapidly increasing day by day and will grow in future also. As at the one end innovations and improvement of technology have made human's life easier and expedient but also made things risky.

We human of 2000 century are living in a digital world surrounded by millions of digital devices which expedite our work but somehow these devices have made human handicapped.

This should be the focus for the researchers to revise or transform the technology by which it can adjust according to user's environment.

The ongoing development and advancement in the field of technology is not only beneficial but also helping to make human's life better.

2.2. Sixth Sense

The methodical description of Sixth sense technology argues to have the acceptance of information separately from the five senses which is apparently independent of the common five senses. This can also be called as Extra Sensory Perception (ESP).

It is a now demanding and highly challenging task to make a device which has a power of perception and the utmost dispute is to complete this task successfully.

The major task for the engineers after the amazing of concept sixth sense technology was to design a kind of interface by which information can be taken from users surroundings and by which device can easily interact with the people.

The major and most demanding intention was to use device own sense according to the program embedded in it by receiving human interaction and to evaluate and analyze the interaction to display the results.

The basic idea behind developing such kind of device is to bring advancement in a technology which easily can acclimatize the human's environment.

2.3. Inventors and Developers

Steve Mann is the pioneer of making a device with sixth sense technology. He became the father of this outstanding technology when brought the concept of wearable computers in early 90's at this time he was just a student in Media Lab.

The basic idea was to make a neck hold projector with the camera system.

Besides, he has not only published many articles and books but also his name is associated with many different projects.

Furthermore this idea was taken over and advanced by Pranav Mistry.

He developed this idea when he was proceeding his PhD from MIT and was also working there as a research assistant.

2.4. Functioning Procedure of Sixth Sense Device

The concept or the procedure of this device is not very complicated or in other words a simple working mechanism is based behind this strong technology.

The very initial task of this device to collect the data from users' environment. By using internet as a data store it generates query; process this query and send back all the processed information to user via display.

Gesture Recognition technology and algorithm of computer vision are used behind this technology to understand users' input. The device will receive the input as the gesture or image produced by user hand or face.

3. PROTOTYPES OF SIXTH SENSE DEVICES

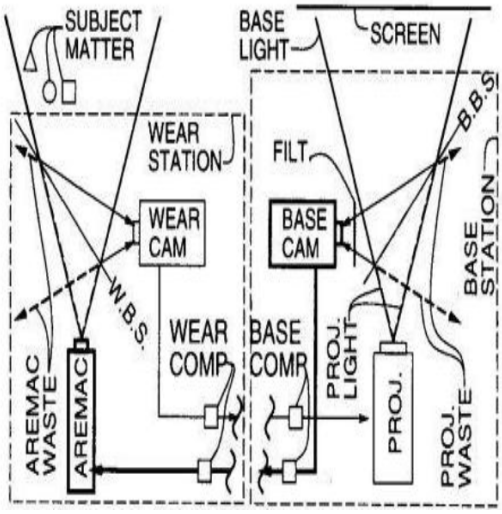
Prototype is very common tool for designing a sample model at the early stage of the project development. Prototype is used to test and evaluate the design of the system before it develops. It gives a clear picture of how a system will look like after completion and how it will act. Software Engineering is incomplete without the early phase prototypes. Few years back prototype was only associated with the novel and innovative hardware projects but now it is the vital part of every software project. It is one of the best possible way to finding system flaws and bugs and fix it without costing much while just making a prototype application. It also helps to test all the possible functional or technical features of a system.

3.1. Synthetic Synesthesia of Sixth Sense or Tele Pointer

Synthetic synesthesia of Sixth Sense or Tele pointer was come into being as the first example by Steve Mann. This device which is basically a combination of hands-free and headwear-free components permitting the tele presence visually along with text and graphics onto a real world object [1].

This device has been tested in telemedicine, and has prospective to turn out to be a huge stimulus in improving excellence of health care along with opportunistic possibilities of effective communication and precise diagnosis assisting to make better decision and consultation.

The working mechanism of Synthetic synesthesia of Sixth Sense or Tele pointer is represented in Graph **1**.



Graph 1: Functioning of Synthetic synesthesia of Sixth Sense (Adapted from Mann 2000, 177).

If an individual at one point projecting video on the screen of person at other point. This may seems magic but this device can do this. The person at one point can point an object of projected screen with laser pointing device and it is pointed on the same spot on the other side. If the person sketch an image in the projected screen it is sketched back on the other side.

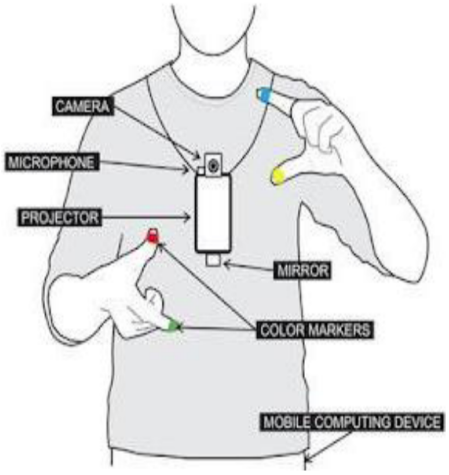
3.2. Wrist Band and Ring

MIT students also converged to integrate the world around them to retrieve information.

This they wanted to do without bringing device into open and hence they were accomplished this task by designing and developing an encircling strips for distinguishing distinctive stuff.

3.3. Wear Ur World (WuW)

The technology realized by Pranav Mistry where he transformed computing device into a wearable and connecting it to Internet via contemporary wireless technologies [2, 3]. This connected contrivance was given a name “Wear Ur World (WUW)”, because of the characteristics of the device, that is, wearable in the environment having used with gestures recognized by webcam and enhanced through computer vision algorithms to identify the objects.



Graph 2: Illustration of WUW (Adapted from Grznar 2013).

According to Pranav Mistry, ‘Sixth Sense' is a device that supplement digital information around us using wearable gesture base interface projecting onto a preferred surface using a camera streaming [2-5].

4. REQUIREMENTS OF WUW

The requirement lists proposed and suggested by Mistry are listed below.

4.1. Software

Every hardware technology is now incomplete without the supported software. Software use in Sixth Sense technology is an open source with source code available and which means that the code can be customized according to the requirement.

Beta version of the Sixth Sense technology has already been supplied or issued by the Mistry.

Considering the number of Windows user this software also supports the Windows platform. Visual Studio is used to write the code. The code is written in two very common and most frequently used languages C++ and C#.

At the start or the launch of the program it first searches for the email with the help of internet and by using Outlook.

4.1.1. Hardware

Hardware is any peripheral device which is attached to the computer or computing device.

The most needed or essential components which help to make this sixth sense device are the color maker, computing hardware, project, camera, mirror a microphone.

Other hardware's for instance cables, connector's circuit boards cables falls inside this category. Also the gears that are requisite are without difficulty obtainable. The necessary gears to construct the 6^{th} sense device are microphone, projector, camera, shade indicators, mirror and a computing piece of equipment.

4.2.1. Color Markers

The use of color markers are the essential part of this device, it helps the camera to understand the position of users' finger which helps to transfer the input to the device. The camera recognizes the marked or colored fingers of a user. The colored tapes of Red, Green, Blue and Yellow are used to recognize the position or the hand gesture of a human. It helps as an interaction instruction for the application interface.

Any other colored tape can be used. Sometimes nail polish of any color or multicolor tapes can be used as an alternative. Making it vital to pass essential and required. Any discrete shade can be used to differentiate.

4.2.2. Camera

Camera will be used with this device and it having these n sorto track the gestures. Mistry has recommended to use Logitech Quick Cam Profornote books.

4.2.3. Projector

Projector is also the essential hardware for the making of sixth sense device. A projector work is to projects the visual information and to display via display device. Any physical object can be used to project the display.

The projector device designed by the Mistry has the three hour battery which is inbuilt. It works as the output device.

4.2.4. Mirror

The mirror plays an important role for this device. The mirror is attached in that way where it can be adjusted or tiled in any direction according to the user need where he wants to display the image and in which location he want to project.

The actual work of a mirror in this prototype is to reflect the image on to the preferred surface and projector is placed where it can pointed downward.

The mirror is affixed for the projection of the image. The individual can easily choose the desired place where he wants to display the result. Moreover the size of the projection can also be changed.

4.2.5. Microphone

Microphone is used with this prototype so that user can get the sound signals while attaching the microphone with the paper. User will use it this way when he wants a sheet of a paper to be used as an interactive surface.

This microphone can alternatively be helpful for the people with physical impairment especially when the user is disabled like who have no hands etc.

5. TECHNOLOGIES BEHIND WUW

There are some factors that churn out sixth sense to be distinctive and by some means intricate also [4, 5]. For example one of those aspects is the tools and concepts at the back. Distinctive and in some way unusual technological conception behind "WUW " are all-pervading computing and in order to get a clear picture of what this research is about the

comprehensive understanding of these terms and terminologies are necessary and hence illustrated as follows:

5.1. Ubiquitous Computing

Ubiquitous Computing is an idea in the field of computer science and software engineering where computing is presented to materialize or come into the view, anytime and the world over.

To extend the ubiquitous computing by make certain the seclusion of user is without a doubt a considerable confront to the software engineer of today's world. However, people with bodily disability and people devoid of computing skills will be able to make use of the computer for all their needs are the utmost quality of Ubiquitous Computing.

5.2. Gesture Recognition

The procedure of be acquainted with the hand actions, face expressions, bodily motion etc. This technology is an enhanced substitute to the text and "GUI".

A number of the current technologies are there working on developing such technologies based on gesture recognition and using digital camera used with web to distinguish signal.

5.3. Augmented Reality

Augmented reality is a common concept in which the vision is augmented by a computing device that is, enhancing the perception of reality by function of technology.

AR is an amalgamation of technologies that facilitate instantaneous integration of computer-generated content with live video displays. It is a instantaneous device intercede view of a real world situation that is intimately or effortlessly included with computer generated sensory objects [3, 6].

In order to accomplish a sufficient intensity of practicality in AR applications, the comparative location involving the user and the scene and between real and virtual objects imperative. By process of head mounted presentation, the augmented scene is projected to the user [7].

5.4. Computer Vision

For high-dimensional data from the real world we have an emerging field referred to as computer vision which consists of schemes to construct mathematical or emblematic information. This technology takes account of the characteristics of Artificial Intelligence (AI) modus oper and I like recognizing the different patterns. Since the data feed for such devices is in the form of light rays and therefore has to detect electromagnetic radiation, it necessitate Image sensors as essential elements along with the algorithm used to get hold of essential information. Although this is always been a challenge to have such algorithms but scientists and software engineers are working on it.

5.5. Radio Frequency Identification

This technology is a measures of discovering objects by distinctive trait of the object using radio wave.

It is a rapidly growing segment to put on the air the distinctiveness of an object wirelessly, and the key principle of this technology is to facilitate the transmit data via a transportable device without the obligation of a line of sight. Hence the tracking and identification of objects can be made even when they are firmly packed together or their surface markings are detached, blemished, hidden or covered.

6. APPLICATIONS AND USES OF WUW

Many distinctive applications of this device exhibit the convenience and practicability of the system offering us freedom from using numerous different devices. Selected uses are described below in order to develop an understanding of the topic:

6.1. Applications

Extensive range of purpose which are merely practical in everyday life nevertheless are also very distinctive from applications that people gets familiar to before using WUW implementations. For instance an article can show live video related to the area under discussion. By accessing internet for searching and passing the information through projection of video over any medium. A number of the features are described below:

6.1.1. Make a Call

Using Sixth sense by calling this application the numbers are projected on preferred surface a user desires positioning the painted object on the number (could be a finger), using computer vision algorithm. The device can understand the user is pointing which number.

The user can use this feature to navigate, to get hold of places, to discover the shortest path and etc.

6.1.3. Illustration and Sketching Application

Using this handy device one can bring about his imaginative talent on preferred surface by using the gesture of the colored object hold by the user, this function draws the illustration and projects it on the desired surface. The illustration can then be saved on any medium and can be retrieved anytime when the user desires.

6.1.4. Take a Picture

By combining four finger tips a rectangular frame can be formed and the camera comprehend it as a border and encapsulate the image inside that frame.

Later, through the drawing applications the user can tap and amend those images on any surface. Furthermore, the descriptions can be shared to anyone by means of an internet access.

6.1.5. Check Mail

The user with the access of Internet can use this application to check email. The user may be allowed to draw '@'sign will open the application allowing the user outlook the old mails. This application will be using internet to search the emails, however, user can even view the mail in the offline mode

6.1.6. Fifth Sense

In order to support and assist people who are disabled, can use this device as their fifth sense, simple adjustment can be done in this device for this purpose. For example, addition of a speaker can facilitate people who could not speak. This way it will not be required or essential for everybody to be taught sign-verbal communication to understand such disabled people [7, 8].

6.2.2. Use in Industries

For those objects that are sensitive and difficult, this device can be used to present information about for example, in business like chemical, metal, petroleum or plastic etc. Mechanism in those industries are susceptible and intricate as people may not be acquainted with how to handle distinctive machines or objects. It can also provide effortless control over the machineries in different industries.

7. EVALUATION

We developed questionnaire based on the following five factors. We include IT managers to participate in the survey. Domain wise exploration and assessment is as follows:

7.1. Benefits of Sixth Sense

Survey revealed that 75% audience agreed to the benefits of this technology Furthermore, according to the audience technology has become apparent, having the potential and capability of sixth sense. Precisely, we utilize our "devices" (computers, mobile phones, tablets, etc.) to use the resources of internet and access information that we desire. Through Sixth Sense we will be able to use a device which is no larger than contemporary cell phones and almost certainly they eventually will be as diminutive as a button on our shirts bringing the internet to us in order to fuse with our world. Sixth Sense will permit us to interrelate with our world by no means as we did before.

7.2. Future Orientation

The main population of this paper is Pakistan and hence keeping in view the audience belonging to third world, surprisingly responded that the future may depend upon this sixth sense technology. The explosion and the use of this technology is colossal. Sufficient awareness of the sixth sense, however will lead to further progress of any technology which facilitate and give support in receipt of information and present any sort of engagement virtually at any time, using moderately the gesticulation and instructions given. In addition, propositions are made on which method is anticipated to thrive and be successful in the forthcoming years.

This also shows that, people are looking forward to beneficial factors of the sixth sense technology which is wearable composition of hardware and software.

It was also observed through the survey that this technology may not make an impression or impact on many people in the sub-continent region of Asia, especially Pakistan.

According to survey, it was contributed by many that wide range of daily life applications could be introduced and accommodated, for example training and development in corporate sector, education sector, health and medicine, manufacturing, visualization, path planning, entertainment and military etc.

7.3. Functional Approach

As with the most comments from the targeted audience in the sample population, this technology will

be put across elusive digital information revealed, and will consent to interrelate with this information. Sixth Sense technology is put into practice in "Sixth Sense/WUW (wear your world)"by means of motion detection, augmented actuality, computer vision and RFID (Radio Frequency Identification).

The survey should that it will shift the computing power along with its innovative and practical relevance to the corporate world of Pakistan. Exclaimed by many participants that user can modify the open source product to their needs, for example taking and organizing photos on floor. It may also become significant part of security system, for example Internet home etc.

It was also noted from the survey that selecting impeccable products and services would not be ideal and the response to that was mix and match.

7.4. Effect on Humans and Human Labor

The focal brainchild at the back of this technology is to revolutionize by means of which people work can together and hence adhere the space. However, the elemental process such as browsing, searching, calendar, seeing contact list etc. will confine or lessen human partaking. According to the survey it is predicted that many people will be utilizing from the benefits by means of such technology edge. Moreover, the audience of survey agreed that the condensed endeavor of physical exertion and reliance of humans on memory may be the corollary. For example people in the survey said that we don't remember the phone numbers of even our closest or loved ones because of over reliance on smart phone memory. So in case of emergency and if the smart phone could not be located and if there is an urgent need to call someone would be a trouble leading to crisis. Objective or physical interfacing as in situation of gestures may integrate technologies that adjoin contextual data to intensify a person thoughtful of the subject in order to make certain precise gesture recognition. For example some people (senior citizens) may not be comfortable or accepting gesture based systems.

In view of the fact that it still is an inspiration of ideas and not more than sensible realization is still at far. Furthermore, image processing challenges and precise location and timing intricacy, remains an impediment to the immense realization of Sixth Sense until today.

In addition, most of the audience in survey agreed that protection against physical interaction is still at large. Access of technology to children was the concern of many. Additionally, social recognition and over- dependence may perhaps heave users away from the real world.

The most of the people involved in survey also showed the sense of insecurity. Devices may become vulnerable and especially in taking pictures in public etc. Someone could still get hold of other information which is unethical.

Survey also revealed that challenges do exist in the use of such technology, for example, controlling virtual curriculum, controlling exams invigilation and how to use it will either take time or may require to devise procedures to the use of such technology along with the aptitude and skills of users may likely be the case.

7.5. Features Enhancement

Under the contemporary method of Artificial Intelligence and stride towards developing recent techniques of human-computer interaction will necessitate enormous capacity to channel the crevice flanked by the real and virtual world.

Most of the audience in survey expressed that this may encourage companies to come up with new light weight devices and to invest in such technology.

For example, the audience in the survey exclaimed that support to interaction can be designed to recognize commands by speech or just a head tilt along with respective response. Furthermore, the technology audience of the survey put it another way that it can be intended to work on a number of platforms.

Technology audience of the survey also accentuate on assemble the technology components to work in multi-vendor environments.

8. CONCLUSION AND FUTURE DIRECTIONS

Summarizing the findings on the basis of response collected, it was envision that even the technology is in development stage this technology will be the science of tomorrow aiming towards seamlessly connecting the digital-to-physical ter rains and will revolutionize the way people interact.

Sixth sense has prospective to be converted into the decisive translucent. It be capable of envisage in

nearby future we will have such devices coming our way.

Having no reservation that the expectations and prospects of Sixth Sense technology is around the corner. Once the device is matured and if the competition and restrictions are surmount by means of the augmentation, undoubtedly will be an advantage to all and sun dry in the whole humanity.

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