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Kinect: Platform for Augmented Reality

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***Abstract*:-- Computing advances and increased smartphone use gives technology system designers greater flexibility in exploiting computer vision to support visually impaired users. Understanding these user's needs will certainly provide insight for the development of improved usability of computing device.**

As new technologies and computer applications prove to be powerful tools for children's with special needs in order to improve specific skills. However, there is still a gap between research development and its applicability in schools, based on their classroom education proposed framework with several activities. This project focus on HCI (Human Computer Interaction) and Face tracking method based on Kinect, Kinect has the advantage over ordinary camera because it has 2 sensor, an ordinary and depth sensor. In this project a method based on depth information is used for optimizing the face recognition combining with hand gesture which can switch automatically for students and teacher easy to operate the PPT screencast system and other teaching activities related to education domain.

I. INTRODUCTION

The study of human computer interaction explores the dimension of research in which more advanced techniques are invented. The study of these techniques is sizzling topic of research and promising application area in today‟s digital world. In past years we had many techniques communicate with computer like Command line Interface (CLI) in which we communicate with computer with the help of different commands after that Graphical User Interface (GUI) which uses graphical icons to communicate with computers. Now-a-days a new interface is introduced which uses human natural behavior to communicate with computers called as Natural User Interface (NUI)[1]. The next technology appeared to us is augmented reality a way to mix virtual information with real environment by different techniques. Tracking techniques are carried out in Augmented Reality. Microsoft Kinect sensor which is capable of capturing depth and colour information of the user in front of it using an array of RGB and infrared cameras. It also used for making different application using human natural behavior.

II. NATURAL USER INTERFACE

(NUIs) are an emerging technology of human-computer interaction that enables users with the ability to interact with a digital computing space through natural body gestures, eliminating the need of traditional keyboard and mouse hardware These interfaces have been implemented in a diverse range of applications like enabling computer aided design. NUI operated in a number of various ways and it is depends on users need. Some NUI‟s are lay on intermediary devices like smart phones and tablets, but more advanced NUI‟s are invisible to the user[1].

NUIs as a method to remotely control robots are relatively unexplored and the usage of this platform as a tool for informal science education is an untapped research field. In this study, the Kinect (Microsoft Corporation), along with readily available libraries is used to control the human behaviour for communicating with computers. This device functions are emitting infrared beams and reading reflected beams from a human body.

III. AUGMENTED REALITY

Augmented Reality that allows users to interact with virtual objects in real world direct (touch-based, voice controlled or gesture-based). AR technology be used to embed 3D graphics into a video in such a way that virtual elements were parts of the real environment.

- Combines Virtual and Real
- 3D Registration
- Real Time Interaction

Augmented Reality uses computer generated graphics to add an effective layer of information operators who does manual industrial tasks. It uses camera to captures real world information which we want with different graphics from graphics system and provide instruction to the operator. These instructions are placed directly onto a video representation of the physical workspace and are displayed on a standard monitor[3].

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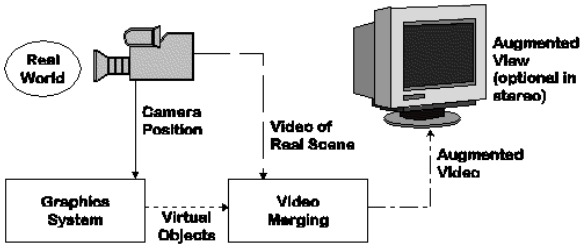

Fig. 1 Monitor Based Augmented Reality

Augmented Reality is the development in sixth sense technology which combines the real and virtual world to do great impact on human computer interaction. It also changes the users perspective to see the world.

IV. PREVIOUSLY USED TECHNIQUES

As AR is the developing system of NUI it uses two main techniques such as Marker based Augmented Reality and Marker less Augmented Reality. AR system supports the coexistence with real world elements (part of user‟s world) and computer aided elements (graphical elements) in the same environment either with any physical pointer or with human natural behaviour.

Marker based Augmented Reality

In marker based augmented reality it uses different types of marker images that can be detected by a camera and used with software as the position for virtual elements placed in a scene. A marker is a piece of paper with black and white markings, though the colors can be used as long as contrast and saturation can be properly recognized by a camera. In marker-based tracking, the system needs to detect the marker, identify it and then calculate the pose. This type of AR technique is capable to identify 2D images, bar codes, fudicial based music etc. Marker-based AR is the most easiest to accomplish[2].

How Marker Detection Procedure Is Held Out

The first aim of a marker detection process is to find the outlines of edges of potential markers, and then to conclude locations of marker‟s corners in the image. In addition to this, detection system needs to confirm that the marker shown is really is a marker and decipher its identity. Finally, the system calculates the posture using the information from the detected marker location[2].

The basic marker detection procedure consists of the following steps:

1) Image acquisition
2) Pre-processing
3) Detection of potential markers and discard of obvious non-markers
4) Identification and decoding of markers
5) Calculation of the marker pose

Fig. 2 Marker transformed into „Augmented Reality" when held in view of a camera. Output as displayed on mobile screen.

A good marker is easily and reliably detectable under all circumstances. The system should also be able to calculate the pose of the camera using the detected marker. Four edges must know that sufficient to calculate the pose of a camera uniquely and the simplest shape to acquire them is a square. In addition, the locations of the corner points are relatively robust, as they can be estimated as intersections of edge lines. Marker based technique is used in various touch oriented devices[3].

Marker less Augmented Reality

Marker less Augmented Reality is now becoming future tracking techniques. AR is now transitioning to marker less experience, defying the restrictions of still images. Now-a-days implementation of marker less AR is using a sensor in devices to accurately detect the real world objects and allow users to take the place of virtual objects in that scene[2,3].

The application made through marker less technology doesn‟t require a marker to display the content. It is more interactive than marker based augmentation.

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Fig. 3 A marker less AR

AR developed their new technologies related to interactive technologies that avoid potential opposition and minimize the negative effects an AR system may have on the user‟s normal interaction with the real world. While avoiding limitations and problems AR describes number of different technologies that can enable interaction are as follows.

Touch

Touch is the direct-manipulative property of touch-sensitive surfaces is often viewed as natural and easy. Finger- or stylus-based touching, dragging, tapping and gesturing can be directly applied to graphical objects, without the need for special-purpose that users may need to operate in other forms of human-computer interaction devices that users may need to operate in other form of human-computer interaction[5].

V. LIMITATIONS

- Low Reproducibility: We can make only few numbers of markers with one algorithm. So that reproducibility becomes limited.
- Privacy and Security: After making one marker for that product if someone else again made that marker for different product then there is no security would achieve.
- Special device require: This technology
- requires special hardware device to scan that
- marker.
- Increase Cost: For making different markers
- cost related to that product will increases.
- Damage of Markers: Markers may be damage
- by water or it may scratched out by other
- things.
- No Reusability: We don‟t use same marker for
- same product again then it reduces reusability.
- Highly sensitive and complicated procedure:
- Marker generation is not easy procedure for that we have to use many algorithms and this is very sensitive procedure.

VI. SUGGESTIONS

Speech

Permits user to interact with a computer system through spoken commands. The system recognizes spoken words and phrases and converts them to a machine-understandable format for interaction[4]. It includes applications like speech-to-text, call routing, and hands-free computer and mobile phone operation.

Gestures

Gesture recognition and tracking has been an\ important and active area of research in the field of Human-Computer Interaction as an AR technique, and sign language recognition. Computer vision techniques measure hand postures and locations from a distance, providing for unrestricted movement. Mounted AR tracking targets on a glove and used hand gestures to directly manipulate virtual objects. Depth-sensing and gesture-tracking technologies are carried out in Augmented Reality such as Microsoft Kinect let you track hands in space and provide freehand gesture input[4].

Fig. 4 In PhobiAR spider phobia treatment

application, users see virtual spiders crawling in the real world and can pick them up with their bare hands. (a) The PhobiAR setup, with Kinect hardware. (b) Users‟ views of the virtual spiders. For example, in the PhobiAR spider phobia treatment application, users see virtual spiders crawling in the real world and can pick them up with their bare hands. Kinect is a device used for gesture

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tracking on the computer[3].

Kinect

In current era ,a new idea have been progressing all over the world this new idea is all about the new technology invented called augmented reality which interact with the human naturally as human survive in real world. one of the device that create an augmented reality environment around the human is "Kinect"[4]. Kinect is developed by the Microsoft in 2010 and named as XBOX. Previously this device is only used for the gaming purpose only. Today Kinect is not bound up to gamming purpose instead it is used for various purposes like medical, commercial, education etc[6].

Fig.5 Kinect Hardware

Features of the Kinect for Windows SDK

- ♣ Capturing and processing the colour image data stream
- ♣ Processing the depth image data stream
- ♣ Capturing the infrared stream
- ♣ Tracking of human skeleton and joint movements of human
- ♣ Human gesture recognition
- ♣ Capturing the audio stream
- ♣ Enabling speech recognition
- ♣ Adjusting the Kinect sensor angle
- ♣ Getting data from the accelerometer
- ♣ Controlling the infrared emitter.

VII. CONCLUSION

This paper includes the AR technology, which is new way of interacting with computers. Augmented Reality is the evolution in sixth sense technology which combines the real and virtual world. Tracking techniques are also the giving great impact on different applications. It gives some limitations to reliable innovation. The emergence of Kinect Sensing device include both software and hardware and research efforts which make us more close towards our goals. The main objective behind this paper is to use the real time interaction with the natural way. In future there is lots of scope to Augmented Reality and deal with real world entities using Kinect device.

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