

# Sixth Sense Technology

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**Abstract-** This paper deals with the new emerging technology The Sixth Sense. It's a wearable mobile interface that augments the physical world around us with the digitalised machine world. This technology bridges the gap between the digital world and real world just by allowing the interaction of humans with the machines through simple hand gestures. The category under which this technology falls is the Augmented Reality Technology. This paper eyes on the possible applications and outcomes of such technology and the advantages and drawbacks of the technology after sourcing or implementing it into real world for use. The most important are the technical challenges faced to get succeeded in future and enhancing it more for future and optimal use.

**Index Terms-** Augment reality, gesture recognition, wearable mobile device, mobile interface, Sixth Sense technology, Human computer interaction.

## I. INTRODUCTION

At seeing today's scenario technology is developing at a very rapid speed. Humans are getting addicted to the technology and are getting habitual to it. This process in future will become very problematic for humans to survive. As this is changing humans according to the behaviour of the machine, soon manpower will get exhausted. Recently many technologies were launched in which one was introduced by Pranav Mistry at TEDx Talks. The area covered for research is the Artificial Intelligence in which it comes the Sixth Sense Technology. This integrates digital information into the physical world and its objects, making the entire world to be computer. It can turn any surface into a touch screen for computing, controlled by simple hand gestures. The device consists of several components connected together through Bluetooth or Wi-Fi with each other. The different components required are LED projector, cell phone, camera, mirror and some different coloured tapes to get recognised the gestures. The technology is mainly based on hand pattern recognition, image capturing, processing, and manipulation, etc. The software of the technology uses the captured video stream, which is captured by the camera, and also tracks the location of the tips of the coloured markers rolled on fingers to recognize the gestures.

## II. SIXTH SENSE TECHNOLOGY

Sixth Sense Technology is that which allows people to interact physically with a digital world that has been augmented on their physical world, thus giving them the sense of having a sixth sense. It is a wearable device that projects visible digital data onto the physical world for users to interact with the digital

world.. The main idea behind this technology is to change the way people interact with devices and bridge the gap between the physical and digital world. The Sixth Sense device, presented by Mistry, consists of a short range projector, camera and mirror. These components are connected to a mobile device. The projector is meant to project images/videos on any wall or surface, the mirror helps to position these projections in front of the user who then interacts by hand gestures through coloured markers attached to each finger. These interactions are detected by the camera, and then passed on to the mobile phone for processing and performing required action for the user. Such simple arrangement and working has introduced a new way of interaction with devices. With such Sixth Sense device, a user can dial a phone number using the hand as key pad, check the timing on a palm watch that only appears when time needs to be checked, or take picture of an event by a simple hand gesture. The key to this lock here is that Sixth Sense recognizes the objects around , displays information automatically and let anyone access to it in every way one wants, in the simplest way possible.

The basic components used in technology are as follows:-

- A. Camera
- B. Projector
- C. Smart Phone
- D. Mirror
- E. Colour Markers

### A) Camera

It acts as a digital eye which connects one to the world of digital information .Camera which works on the computer-vision based techniques which tracks user's hand gestures and captures images of the view at which the user looks and physical objects. Further, it transfers the images to smart phone.

### B) Projector

A tiny LED projector, with a 3 hours battery backup, projects the visual information sent from the smart phone on any surface, wall or person used as interface.

### C) Smart Phone

A Web-enabled smart phone in the user's pocket processes the video data, using vision algorithms to identify the hand gestures. Other software searches the Web and interprets the hand gestures.

### D) Mirror

The mirror reflects image as projected by the projector, hung loosely on the neck of the user, on any surface.

### E) Colour Markers

The user's fingers tips are marked with red, yellow, green and blue tapes. The movements and arrangements of these coloured markers are interpreted into patterns that act as interaction instructions for the projected application interfaces

### III. FUNCTIONING

The hardware that makes Sixth Sense work contains a camera, a mirror and a projector and is connected to a Bluetooth of the smart phone that can slip comfortably into one's pocket. The camera recognizes individuals, images, gestures one makes with their hands. Information is sent to the Smartphone for processing. The downward-facing projector projects the image on to the mirror. Mirror reflects image on to the desired surface.

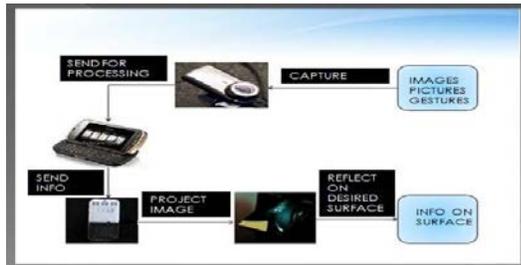


Fig. 1 Components of the Pendant

### IV. APPLICATIONS OF THE SIXTH SENSE TECHNOLOGY

A) The map application lets the user study a map displayed on a nearby surface using hand gestures like zoom in zoom out etc.

B) The drawing application lets the user draw on any platform by tracking the fingertip movements of the user's index finger.

C) The camera helps user to take pictures of the scene he sees and later he can arrange them on any surface.

D) Enabling clock, inbox browsing, calendar, searching gallery, seeing contact list etc.

E) The device can tell arrival, departure or delay time of air plane on tickets.

### V. CHALLENGES BEFORE SIXTH SENSE TECHNOLOGY

A) Hardware Limitations – The prototypes in the labs have not been assembled into a compact device, which can be used by user on daily basis, much due to hardware challenges.

B) Software Limitations - dependency on Microsoft code libraries; image processing challenges and accurate positioning and timing difficulties along with synchronization are the main obstacles before implementation.

C) Implementation Limitations – Conversion into a final product from ideas is still a challenge as no live demos are given, only recorded videos of the application are available.

D) Security and Privacy Issues: Hacking information from Facebook, taking pictures in public; a person could even obtain information about a total stranger in public due to the face recognition algorithm of the device are some problems to be concerned about.

E) Health and Safety Concerns: Brightness of projector on user's eyes; safety concerns with regards to wearing the device while driving are the major areas of concern.

F) Away from Reality – Over-reliance on the technology may grab the users away from the real world where no physical surface touch is available to feel.

G) Educational Aspects – Challenges exist in conducting virtual classes, the extent to which should be implemented and parents acceptance, which might take time.

### VI. WINDOW FOR OPPURTUNITIES IN SIXTH SENSE TECHNOLOGY

Since its introduction, this technology has created ripples among the public, grabbing media attention and receiving great expectations from the people. Following are the areas for its brighter opportunities laying ahead -

A) A new technology with lots of potential:- With the ability to bridge the gap between the real and virtual world it is a step towards developing new methods of human-computer interaction.

B) Accessibility:- Sixth sense technology enables the user easy access and communication with the device using only the hand gestures.

C) Time Saving:- Tasks like taking pictures, can be done faster and on-the-spot without the need to take out any device outside the pocket and within a fraction of seconds the world is in your hands with the information one needs.

D) Financial Benefits:- The devices with sixth sense technology can be made light weight and small shape, that includes all features like Bluetooth, GPS, camera, Wi-Fi, microphone, speakers and touch pad, which will open doors for this invention in the market; from the production side, can be produced using cheap hardware components.

E) Many Features:- supports multi-touch and multi-user interaction; can be designed to recognise commands by speech or just a head tilt, and responds accordingly. The device can be designed to work on several platforms (like Google Glasses) like iPhone and Android and be used even in the dark due o projector or laser light.

F) Applicability:- Wide range of daily life applications from medical, manufacturing, visualization, pathplanning, entertainment and military to educational field where old traditional education system shifts to a fun and interactive one.

### VII. CONCLUSIONS

Sixth Sense technology identifies the objects around us, displaying information automatically and letting us to access it in any way we need .The Sixth Sense device implements several applications that demonstrate the usefulness, flexibility and viability of the system. Allowing humans to interact with this information through natural hand gestures. The potential of becoming the lattermost "transparent" user interface for accessing information about everything around us. Currently the prototype of the device line around \$350 to build. It could change the way we interact with the real world and truly give everyone complete alertness and awareness of the environment around us. The Sixth Sense prototype implements several applications that expose the usefulness, viability and flexibility of the system. It will definitely revolutionize the world.

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