

Sixth Sense Technology

Akshay Agarwal¹, Aravinth Subramanian²

^{1,2}Department of Computer Science and Engineering, PES Institute of Technology-Bangalore South Campus, Bangalore, India

Abstract: "Sixth Sense Technology" is a gesture interface which can be worn and that augments the physical world around us with the digital information and lets us use natural hand gestures to interact with that information. Information is not confined to computing devices because of Sixth Sense Technology. It minimizes the gap between the physical and the digital world. It displays information on surfaces and physical objects around us and lets us interact with the projected information through hand gestures, arm movements or the object itself. It is not widely known as of now but time is not far when this technology will change our perception of the world. It will change the way we live.

Keywords: Augment, Gesture, Objects

1. Introduction

We grew up being in contact with the objects around us. We can touch these objects and hence they are much fun to use. When we talk about objects, one thing that is associated with them is gestures i.e how we manipulate these objects. We use gestures not only to interact with these objects but also interact with each other. Sixth Sense Technology answers the question of how we can use our knowledge of these objects and how we can use it to interact with the digital world. Although the reduction in the size of computing devices like the mobile phone, allows us to carry them in our pockets and keeps us continuously connected to the digital world, there is no actual link between our digital devices and our interactions with the physical world. Information is restricted in papers in real world or some computing device in digital world. Sixth Sense removes this restriction by bringing the digital information out into the tangible physical world, and allowing us to interact with this information via natural actions. Sixth Sense frees information from its confines by mixing it with reality, and thus making the entire world your computer. Right now, we use our devices to go into the internet and get information that we want. With Sixth Sense we will use a device which is small in size and we can simply hang it around our necks to interact with the world. Sixth Sense is a mini projector which connects us to the Cloud.

2. Motivation

When we were thinking about what project we should do in the summers, we came across a TED talk by Pranav Mistry where he was talking about how we can inter-mix the digital and the real world. The way he was showing how he was able to use just his fingers to make a clock, take pictures, get weather reports and a whole lot of other things simply fascinated me. This enthralled us and was something we had to research on.

3. Related Work

All Mouse and touchpad are primarily used for primitive human computer interaction (HCI). The use of Mouse and touchpad is eliminated by using the vision based Human Computer Interaction through Real Time Hand Tracking and Gesture Recognition. A webcam is used to trace a user's

hand actions to initiate specific interactions. The technology is based on the assumption that all hand movements are properly coordinated. The skin color based ROI segmentation and Viola-Jones Haar-like feature based object recognition are used to optimize hand gesture recognition for mouse operation. Color is used as an important feature to first define a Region of Interest (ROI). Then within this ROI, hand positions are detected by using Haar-like features and AdaBoost learning algorithm. Once gestures were recognized, then they were assigned to different mouse events, such as right click, left click, and undo.

4. Language and Algorithm

C Sharp is a modern and object-oriented programming language wherein an algorithm is developed for color recognition and motion detection. It is full of features that make development faster and easier, usually at the cost of flexibility and/or runtime performance and is faster than C, C++, JAVA and MATLAB.

A Webcam captures the information and sends it for processing. The mechanism works in a continuous manner in which the captured real time information is converted into frames of images. The frames of images are obtained continuously one after the other and the latest frame is considered further for processing i.e. for the color recognition purpose. The camera captures the object in an inverted fashion i.e. the right side of the real time image appears as left in the captured image and vice-versa. Therefore the captured image is first and foremost resized and flipped so that the captured image is found to be the same as the real time image.

5. Components Required

There are some components which are required to build a Sixth Sense device.

1) Camera

It is used to click photos of the objects which are in its scope. It works as a digital eye which connects to the digital information.

2) Colored Markers

Different colors such as blue, red, yellow are used as tapes and are placed at the user's finger tips. These tapes help the webcam recognize the hand gestures. When we

move our hands these markers also move and the web camera recognizes the hand gestures.

3) Mobile Component

Smart phones enabled with web process the video data. Basic processing works on computer vision algorithms. Actions are interpreted by the phones with the help of the colored markers.

4) Projector

Projector is used to display information on the surfaces and objects which are used as interfaces.

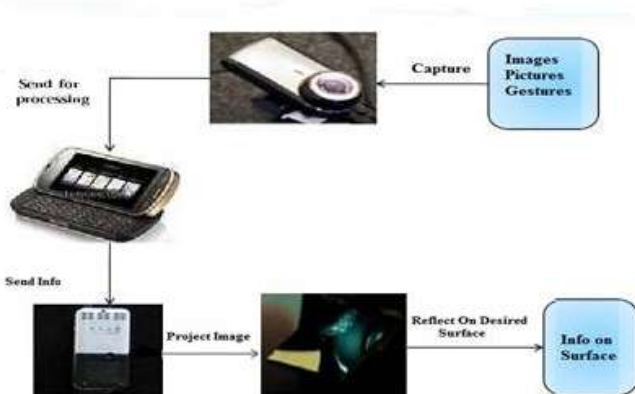
5) Mirror

Mirror is very important since we are using a device that is hung around our necks. The reflected image is obtained on a surface or an object, thus freeing it from the confines of computing devices and bringing it to the physical world.

6. Why Sixth Sense Technology

We humans make decisions after taking information from our five sense organs. However, the decisions we take might not always be right. This information is available on the internet. We can acquire this information through computers or mobile phones which are connected to the internet. However this information is restricted to the screen. There is no direct interaction between us and the digital world. Sixth Sense Technology enables us to interact directly with the digital world, thus reducing the gap between physical world and digital world.

The Working Of The Sixth Sense Device



7. Requirements

Sixth Sense requires major advancements in technology to be implemented efficiently and effectively.

• Hardware Requirements

High speed hardware and software processing computing devices are required.

• Shape and Size

The size of the device has to be made small and compact so that it is convenient to use.

• Software Requirements

Increasing the accuracy of the device is very important so that it can be used in various other fields where accuracy is an important factor.

• Improving the Implementation approach

We need to find a substitute to colored markers. We can use lasers instead of color markers, which is a more practical approach.

• Educational field

An extent must be defined to which this technology will be implanted in schools or colleges. Students should be able to integrate the digital world and the physical world, but should not be dragged into virtual world away from their actual life.

• Price

The price of this technology as of now is not affordable to masses, so the companies producing this technology has to reduce the price so that it can be used by masses.

8. Applications

• As a calling phone

The Sixth Sense prototype can be used to display the calling keypad on your hand or paper and then it can be used as a phone.

• Map navigator

With the help of sixth sense technology we can actually project the map and zoom in and zoom out and navigate to the desired destination.

• As a watch

The user can use his fingers to draw a circular clock on his wrist. This circle can actually work as a clock. We won't need to buy expensive wrist watches.

• Newspaper articles in the form of videos

Sixth Sense can enrich a user's multimedia experiences. It can be programmed to display actual videos related to the article which the user is reading.

• Drawing tool

This works exactly like the paint software in windows, in this you can project the screen anywhere and start drawing with the help of colored clips and hand gestures.

• Product information

Sixth Sense uses the web camera to recognize products we hold in our hand, and then gives us detailed information on those products. Imagine you want to buy a soap. We just have to look at the soap and hold it in our hands and it will show you whether it's good or bad and if it fits your preference or not.

• Flight updates

The system will recognize your boarding pass and in real time grab the information and let you know whether your flight is on time or if there is any update regarding the flights.

• Ease of taking pictures

If you fashion your index fingers and thumbs into a square, the system will snap a photo which makes life a

lot easier compared to taking the phone outside and clicking pictures.

9. Future Opportunities

This technology can bring an evolution to the real world with lots of potential and ability to bridge gap between real and virtual world.

- It will be an open source product so user can modify it according to their needs.
- It can be used in automated manufacturing factories and made control easy over the machinery.
- It can give information about new person to whom we meeting first time.
- This technology can be used as a replacement of the 5th senses for handicapped people.
- Sixth sense is developed to seamlessly integrate information into reality. The future may depend upon this sixth sense.
- We can easily say that if the appropriate technology is developed then Sixth Sense Technology will be used by most of the people by the end of 2020.
- This technology enables one to account, compute and browse data on any piece of paper we can find around.

10. Technologies Related to Sixth Sense

• *Augmented Reality*

It allows the user to have a virtual experience in real world in real time. Augmented reality adds graphics and sound to non-living things.

• *Gesture Recognition*

Sixth Sense Technology use hand movements and actions along with mathematical algorithms. Movement of the colored tapes on the user's finger tips provide information about the hand orientation.

• *Computer Vision*

Is the technology in which the computing devices are able to recognize the image and give necessary information related to that image. It involves some aspects of artificial intelligence.

• *Radio Frequency Identification*

These systems transfer the information of an object wirelessly using radio magnetic waves. It transfers data via a portable device.

11. Conclusion

Humans are interested in information. However, this information is confined to pages, books, computers, mobile phones and other digital devices. Sixth Sense technology frees the data from these restrictions and tries to combine the digital intangible world and the physical tangible world. Sixth Sense Technology has the potential of becoming a "transparent" user interface. Sixth Sense Technology enables us to be "humans", meaning we can interact more with the physical world around us rather than being machines sitting in front of other machines. It may change

the way we interact in the real world and give complete awareness of the environment around us.

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