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A STEP TOWARDS SMART CITY USING SIXTH SENSE TECHNOLOGY

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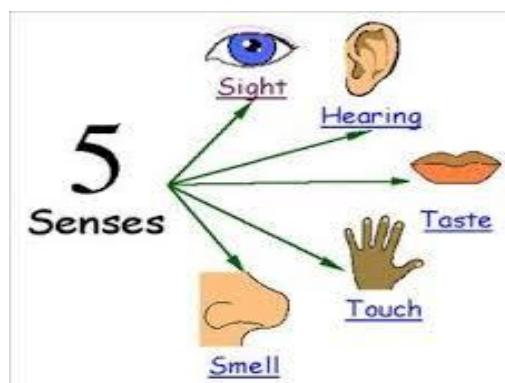
Abstract: - 'Sixth Sense' is a gestural interface that augments the physical world around us with digital information and lets us use natural hand gestures to interact with that information. Every one of us is aware of the five basic senses – seeing, feeling, smelling, tasting and hearing. These senses have evolved through millions of years. Sixth sense technology helps to bridge this gap between tangible and non-tangible world. But in this new age of technologies the most important information that helps one to make right decision is something that cannot be perceived and analyzed by our natural senses. The sixth sense technology concept is an effort to connect this data in the digital world in to the real world. Although miniaturized versions of computers help us to connect to the digital world there aren't any device as of now which gives a direct link between the digital world and our physical interaction with the real world. Using this sixth sense technology we can easily change or develop the developing countries / cities into a smart city/ developed country.

Keywords: Computers, Sixth Sense, Digital India, Smart city.

I. Introduction

Computers – Early Stage

Computers began to rule the mankind from many centuries. People used them for many purpose and they were later found to be used in the fields such as education, hospitals, offices, etc. As the time passes many things have changed and computers are no such exceptions. For each and every work, we have started to depend on the computers. Many scientists are developing a technology to integrate the physical world with the digital world. And the internet has become the main source of human's knowledge. This sixth sense creates a way to meet demand for this kind of device which is simplified to make a type of task easier.



Evolution of Sixth Sense

Initially sixth sense technology was developed by Steve Mann, a head worn projector with the camera. Actually, the first prototype of the sixth sense technology was actually bigger than what it looks like today.



Fig: First Prototype of Sixth sense technology

Later Pranav Mistry and Pattie Maes developed the sixth sense Technology an Augmented reality. 'Sixth Sense' is a gestural interface that augments the physical world around us with digital information and lets us use natural hand gestures to interact with that information the hardware components are coupled in a pendant like mobile wearable device. Mistry came up with a different and more convenient device which is a neck worn portable camera that allows users more space for their daily actions. Sixth Sense Technology can make the entire world as computers via hand gestures and it is the science of tomorrow with the aim of connecting the digital world with the physical world seamlessly, eliminating hardware devices. It is essentially a wearable computer that can surf the web, make phone calls and even connect to other computing devices. This is considered to be more portable and more interactive than any Smartphone, laptop or tablet available today. The movements and arrangements of these fiducials are interpreted into gestures that act as interaction instructions for the projected application interfaces. The maximum number of tracked fingers is only constrained by the number of unique fiducials, thus Sixth Sense also supports multi-touch and multi-user interaction.

II. Existing System

Sixth Sense is a mini-projector coupled with a camera and a cell phone which acts as the computer and our connection to the Cloud, all the information stored on the web. The hardware components are coupled in a pendant like mobile wearable Device. Both the projector and the camera are connected to the mobile computing device in the use pocket.

a) Software. 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.

(b) Hardware. In order to control the Sixth Sense, it requires some advance hardware as it appears to be. In some of the public presentations, the presenter wears some controlling devices including color markers, camera and projector. They have to be compact and easily controllable. However, the hardware integration of Sixth Sense technology is quite innovative since they have managed to develop camera and pen like day to day objects.

(c) Projector. It projects visual information enabling surfaces, walls and physical objects around us to be used as interfaces.

(d) Camera. Camera recognizes and tracks user's hand gestures and physical objects using Computer vision based techniques.

(e) Colored Markers. Colored markers placed at the tip of the users fingers using simple computer vision techniques. It helps the webcam to track the movement of fingers. The movements and arrangements of these fiducials are interpreted into gestures that act as interaction instructions for the projected application interfaces.

(f) **Mobile Device.** Mobile device may be a laptop, PDA, smart phones etc. These are connected to other hardware devices and sends information to projector for projection. The important thing is that the device is a mobile device. It means, it is so light that we can take it with us where ever we want to. It is as small as a cell phone and is so simple to use.

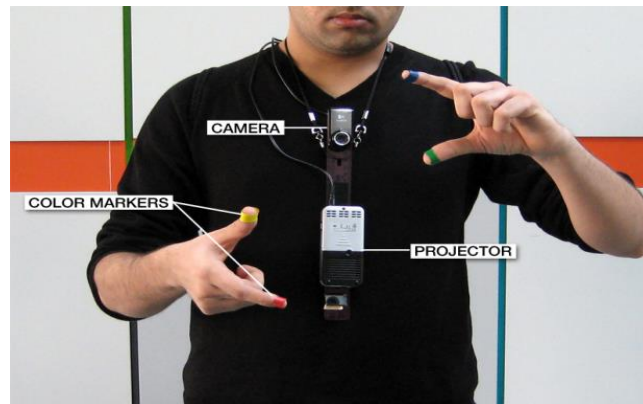


Fig: Existing system of sixth sense technology

Working

Sixth sense device analyses what user sees and visually augments the surfaces and physical objects user is interacting with. What the researchers have done is to combine a number of standard gadgets including a webcam, projector and mobile phone, to form a brand new interaction experience. The key here is that Sixth Sense recognizes the objects around us, displaying information automatically and letting us access it in any way we want, in the simplest way possible. The technology itself is nothing more than the combination of some stunning technologies but the idea of combining those technologies is really great. The technology is mainly based on hand gesture recognition, image capturing, processing and manipulation, etc.

The Sixth Sense prototype comprises a pocket projector a mirror and a camera contained in a pendant like, wearable device. Both the projector and the camera are connected to a mobile computing device in the user's pocket. The projector projects visual information enabling surfaces, walls and physical objects around us to be used as interfaces, while the camera recognizes and tracks user's hand gestures and physical objects using computer-vision based techniques. The camera is used to recognize and track user's hand gestures and physical objects using computer vision based techniques, while the projector is used to project visual information on walls or on any physical thing around us. Other hardware includes mirror and coloured caps to be used for fingers. The software of the technology uses the video stream, which is captured by the camera and also tracks the location of the tips of the fingers to recognize the gestures. This process is done using some techniques of 4 computer vision. Basically it is a device which is a mini projector and which can be projected on any surface, it carries the information stored in it and also collects information from the web. It is the one which obey hand gestures of ours and gives us what we want to see and know. It is the combined technology of computer along with cell phone. It works when a person hang it on his neck and start projecting through the micro projector attached to it. Our fingers works like the keyboard as well as the mouse.

III. Proposed System

Smart Cities

Sixth Sense finds its approach in many ways. Information and communications technology (ICT) is a key enabler for cities to address these challenges in a 'smart' manner. A Smart City is one with at least one initiative addressing one or more of the following six characteristics: Smart Governance, Smart People, Smart Living, Smart Mobility, Smart Economy and Smart Environment. Smart City initiatives are spread across all six characteristics, but most frequently focus on Smart Environment and Smart Mobility. The success of a Smart

City depends on the depth and effectiveness of targeted improvement within each area or initiative and on the coherence or balance of the portfolio of initiatives across the city.

Smart Cities in Tamil Nadu

According to official report, Tamil Nadu has been given the opportunity to nominate 12 cities to be developed as smart cities. Tamil Nadu comes second with the allocation of 12 Smart Cities and 33 AMRUT Cities.

The Centre has partnered with Bloomberg Philanthropies for the Smart Cities challenge. "They basically look at how a city has found a solution to the most pressing need of its people and turned it into an opportunity to improve lives, an official of the Union Urban Development Ministry says.

IV. Implementation and Result Analysis

Hardware:

- Any windows computer/Laptop
- A camera
- Projector
- Color markers

Software:

- Direct X
- Visual studios
- Adobe Flash player
- MS Outlook
- Internet connection is also required

Relation between Smart City and Sixth Sense

Although the general and specific objectives are very similar across projects, the technological solutions employed are very different. Some companies (like Google) are working on the technologies to try and integrate (parts of) sixth sense. Digital India is an initiative of Government of India to integrate the government departments and the people of India. It aims at ensuring that the government services are made available to citizens electronically by reducing paperwork. It also plans to connect the rural areas with high-speed internet networks. Digital India has three core components. These include:

- The creation of digital infrastructure
- Delivering services digitally
- Digital literacy

Digital India is also related to the Sixth Sense Technology. Digital Technologies which include Cloud Computing and Mobile Applications have emerged as catalysts for rapid economic growth and citizen empowerment across the globe. Digital technologies are being increasingly used by us in everyday lives from retail stores to government offices. They help us to connect with each other and also to share information on issues and concerns faced by us. In some cases they also enable resolution of those issues in near real time.

V. Future Work Development

Intelligent traffic systems

Traffic management Smart City projects focus on Smart Mobility and Smart Environment. They are ICT-enabled systems, typically based on road sensors or active GPS. The objective is to monitor real-time traffic information in order to manage city traffic in the most efficient and environmentally friendly way possible. This objective is to be achieved by speeding up the resolution of road network issues, reducing congestion and improving traffic flow. Although the general and specific objectives are very similar across projects, the technological solutions employed are very different.

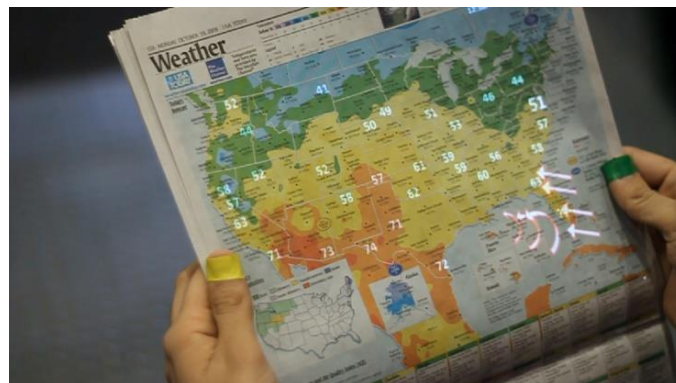
Participation platforms

The open data projects include citizen or user competitions to develop apps and other digital services to improve the quality and level of participation of public services. This is based on input from citizens obtained by providing ideation platforms to develop a better city, or competitions to take advantage of open public data to develop apps, useful new services.

Applications

The Sixth Sense prototype implements several applications that demonstrate the usefulness, viability and flexibility of the system.

- The user can pick up a product in supermarket (e.g. a package of paper towels), and the system could display related information (e.g. the amount of bleach used) back on the product itself.
- The system can recognize any book picked up by the user and display Amazon rating on the book cover.
- As the user opens a book, the system can display additional information such as reader's comments.
- The system is able to recognize individual pages of a book and display annotation by the user's friend. This demo also suggested the system would be able to handle tilted surface.
- The system is able to recognize newspaper articles and project the most recent video on the news event on a blank region of the newspaper.
- The system is able to recognize people by their appearances and project a word cloud of related information retrieved from the internet on the person's body.
- The system is able to recognize a boarding pass and display related information such as flight delay and gate change.
- The user can draw a circle on his or her wrist, and the system will project a clock on it.





Advantages

- Open Source Software:

The software that is used to interpret and analysis the data collected by the device is going to be made open source as said by its inventor. This will enable other developers to contribute to the development of the system.

- Cost Effective:

The cost incurred for the construction of the Sixth Sense prototype is quite low. It was made from parts collected together from common devices. And a typical Sixth Sense device costs up to \$300. The Sixth Sense devices have not been made in large scale for commercial purpose. Once that happens it's almost certain that the device will cost much lower than the current price.

- Data access directly from the machines in real time:

With the help of a Sixth Sense device the user can easily access data from any machine at real time speed. The user doesn't require any machine human interface to access the data. The data access through recognition of hand gestures is much easier and user friendlier compared to the text user interface or graphical user interface which requires keyboard or mouse.

- Portable:

One of the main advantages of the Sixth Sense devices is its small size and portability. It can be easily carried around without any difficulty. The

prototype of the Sixth Sense is designed in such a way that it gives more importance to the portability factor. All the devices are light in weight and the Smartphone can easily fit in to the user's pocket Support Multi touch and Multi user interaction. Multi touch and Multi user interaction is another added feature of the Sixth Sense devices. Multi sensing technique allows the user to interact with system with more than one finger at a time. Sixth Sense devices also in-corporate Multi user functionality. This is typically useful for large interaction scenarios such as interactive table tops and walls.

VI. Conclusion

Sixth Sense Technology is creating havoc impact in the IT and electronics industry. In fact, mobile computing simply goes beyond the next level. It is a superb invention that is showing new dimensions. Although the general and specific objectives are very similar across projects, the technological solutions employed are very different. We believe that many of the methods that we will develop will be based on notions about how groups compete and cooperate and we consider that the sort of infrastructure, expertise and data that will characterize the smart city will enable equity to be easily established and such cities to improve the quality of urban life. Implementation of this technology will create a revolution; it will not only make it simple but also make our country digitalized.

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