IOSR Journal of Electronics & Communication Engineering (IOSR-JECE)
ISSN : 2278-2834, ISBN : 2278-8735, PP : 54-59
www.iosrjournals.org

TOWARDS NEW INTERFACES AT MULTITOUCH TECHNOLOGY

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ABSTRACT: *In today's society, the way in which we physically interact with electronic devices is changing how we focus our technological research. This change has led to many great advances, including the development of new interfaces at multi touch technology. Through the use of these new interfaces, the operator is given an alternative method of how he or she can interact with a device. The new interfaces discussed in this paper include sixth sense technology, sparsh technology.*

Keywords- *sixth sense technology, Smartphone, multitouch gestures*

I. INTRODUCTION

We've evolved over millions of years to sense the world around us. When we encounter something, someone or some place, we use our five natural senses which includes eye, ear, nose, tongue mind and body to perceive information about it; that information helps us make decisions and chose the right actions to take. But arguably the most useful information that can help us make the right decision is not naturally perceivable with our five senses, namely the data, information and knowledge that mankind has accumulated about everything and which is increasingly all available online[1].

Although the miniaturization of computing devices allows us to carry computers in our pockets, keeping us continually connected to the digital world, there is no link between our digital devices and our interactions with the physical world. Information is confined traditionally on paper or digitally on a screen. This new interface bridges this gap, bringing intangible, digital information out into the tangible world, and allowing us to interact with this information via natural hand gestures[4]. This technology frees information from its confines by seamlessly integrating it with reality, and thus making the entire world your computer.

II. FIRST NEW INTERFACE-SIXTH SENSE TECHNOLOGY

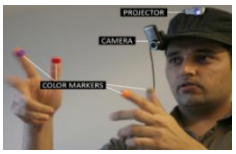

Figure 1: sixth sense device

This is a wearable "gesture based" device that augments the physical world with digital information and lets people use natural hand gestures to interact with that information

It was developed by Pranav Mistry, a PhD student in the Fluid Interfaces Group at the MIT Media Lab.

Right now, we use our "devices" (computers, mobile phones, tablets, etc.) to go into the internet and get information that we want. With This new interface we will use a device no bigger than current cell phones and probably eventually as small as a button on our shirts to bring the internet to us in order to interact with our world!

This will allow us to interact with our world like never before. We can get information on anything we want from anywhere within a few moments! We will not only be able to interact with things on a whole new level but also with people! One great part of the device is its ability to scan objects or even people and project out information regarding what you are looking at.

Hardware components:

The hardware components are coupled in a pendant like mobile wearable device**.**

_ Camera
_ Projector
_ Mirror
_ Mobile Component
_ Color Markers

Camera:

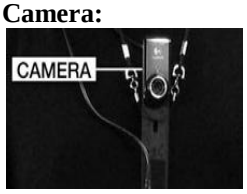

Figure2: Camera

A webcam captures and recognizes an object in view and tracks the user's hand gestures using computer-vision based techniques. It sends the data to the smart phone. The camera, in a sense, acts as a digital eye, seeing what the user sees. It also tracks the movements of the thumbs and index fingers of both of the user's hands. The camera recognizes objects around you instantly, with the micro projector overlaying the information on any surface, including the object itself or your hand.

Projector:

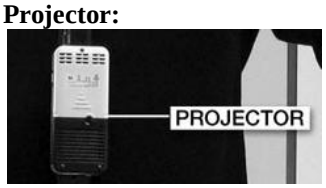

Figure3: Projector

A projector opens up interaction and sharing. The project itself contains a battery inside, with 3 hours of battery life. The projector projects visual information enabling surfaces, walls and physical objects around us to be *used as interfaces*. We want this thing to merge with the physical world in a real physical sense. You are touching that object and projecting info onto that object. The information will look like it is part of the object. A tiny LED projector displays data sent from the smart phone on any surface in view–object, wall, or person.

Mirror:

The usage of the mirror is significant as the projector dangles pointing downwards from the neck.

Mobile Component:

Figure 4: Smartphone

The mobile devices like Smartphone in our pockets transmit and receive voice and data anywhere and to anyone via the mobile internet. An accompanying Smartphone runs the software, and handles the connection to the internet. A Web-enabled smart phone in the user's pocket processes the video data. Other software searches the Web and interprets the hand gestures.

Color Markers:

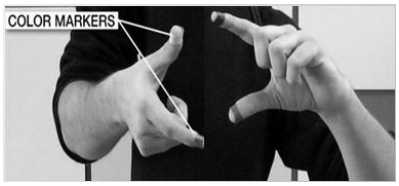

Figure5: Color Markers

It is at the tip of the user's fingers. Marking the user's fingers with red, yellow, green, and blue tape helps the webcam recognize gestures. The movements and arrangements of these makers are interpreted into gestures that act as interaction instructions for the projected application interfaces.

Working:

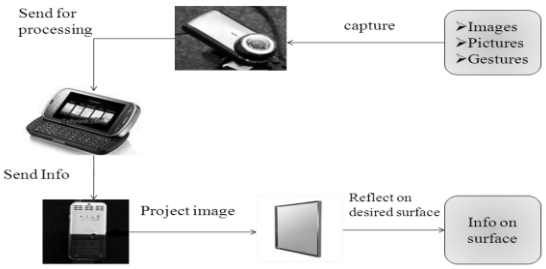

Figure 6: Working

- The camera recognizes individuals, images, pictures, gestures one makes with their hands.
- Information is sent to the Smartphone for processing.
- The downward-facing projector projects the output image on to the mirror.
- Mirror reflects image on to the desired surface. Thus, digital information is freed from its confines and placed in the physical world.

The software recognizes 3 kinds of gestures:

- Multitouch gestures, like the ones you see in Microsoft Surface or the iPhone --where you touch the screen and make the map move by pinching and dragging.
- Freehand gestures, like when you take a picture.
- Iconic gestures, drawing an icon in the air. Like, whenever I draw a star, show me the weather. When we draw a magnifying glass, show me the map. You might want to use other gestures that you use in everyday life. This system is very customizable.

Computer vision based algorithm and the recognition algorithms:

Computer vision is the science and technology of machines that can see. As a scientific discipline, computer vision is concerned with the theory behind artificial systems that extract information from images. The image data can take many forms, such as video sequences, views from multiple cameras, or multi-dimensional data from a medical scanner. Computer vision[3], on the other hand, studies and describes the processes implemented in software and hardware behind artificial vision systems. The software tracks the user's gestures using computer-vision based algorithms. Computer vision is, in some ways, the inverse of computer graphics. While computer graphics produces image data from 3D models, computer vision often produces 3D models from image data. There is also a trend towards a combination of the two disciplines, e.g., as explored in augmented reality.

The fields most closely related to computer vision are image processing, image analysis and machine vision. Image processing and image analysis tend to focus on 2D images, how to transform one image to another. his characterization implies that image recessing analysis neither require assumptions nor produce interpretations about the image content. Computer vision tends to focus on the 3D scene projected onto one or several images, e.g., how to reconstruct structure or other information about the 3D scene from one or several images. Machine vision tends to focus on applications, mainly in manufacturing, e.g., vision based autonomous robots and systems for vision based inspection or measurement.

The computer vision system for tracking and recognizing the hand postures that control the menus is based on a combination of multi-scale color feature detection, view based hierarchical hand models and particle filtering. The hand postures or states are represented in terms of hierarchies of multi-scale color image features at different scales, with qualitative inter-relations in terms of scale, position and orientation. In each image, detection of multiscale color features is performed. The hand postures are then simultaneously detected[4,5] and tracked using particle filtering, with an extension of layered sampling referred to as hierarchical layered sampling.

Usefulness of sixth sense device:

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

- Make a call
- Call up a map
- Check the time
- Create multimedia reading experience
- Drawing application
- Zooming features
- Get product information

- Get book information
- Get flight updates
- Feed information on people
- Take pictures
- Check the email

Create multimedia reading experiences:

Figure 10: Video in Newspaper

This system also augments physical objects the user is interacting with by projecting more information about these objects projected on them. For example, a newspaper can show live video news or dynamic information can be provided on a regular piece of paper. Thus a piece of paper turns into a video display.

Drawing application:

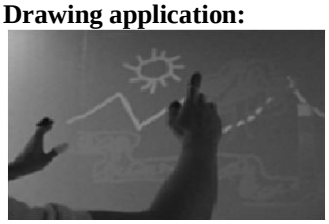

Figure 11: Drawing

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

Zooming features:

Figure 12: Zoom in and Zoom out

The user can zoom in or zoom out using intuitive hand movements.

Get product information:

This uses image recognition or marker technology to recognize products you pick up, then feeds you information on those products. For example, if you're trying to shop "green" and are looking for paper towels with the least amount of bleach in them, the system will scan the product you pick up off the shelf and give you guidance on whether this product is a good choice for you.

ake pictures:

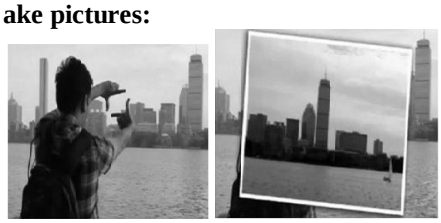

Figure 14: Take Pictures

If we fashion our index fingers and thumbs into a square (the typical "framing" gesture),the system will snap a photo. After taking the desired number of photos, we can project them onto a surface, and use gestures to sort through the photos, and organize and resize them.

Get flight updates:

The system will recognize your boarding pass and let you know whether your flight is on time and if the gate has changed.

Feed information on people:

Figure 15: Information on people

This is also capable of "a more controversial use". When you go out and meet someone, projecting relevant information such as what they do, where they work, and also m it could display tags about the person floating on their shirt. It could be handy if it displayed their facebook relationship status so that you knew not to waste your time.

II. ANOTHER NEW INTERFACE- SPARSH

SPARSH' is a novel interaction method to transfer data between digital devices by simple touch gestures. Sparsh prototype system is designed and developed by Pranav Mistry of the MIT Media Lab.

Sparsh lets the user touch whatever data item he or she wants to copy from a device. At that moment, the data item is conceptually saved in the user. Next, the user touches the other device he or she wants to paste/pass the saved content into. Sparsh uses touch-based interactions as indications for what to copy and where to pass it. Technically, the actual transfer of media happens via the information cloud.

The user authentication is achieved by face recognition, fingerprint detection or username-password combination. Sparsh lets the user conceptually transfer media (pictures, text, video, links) from one digital device to one's body and pass it to the other digital device by simple touch gestures. At present, Sparsh system support Android and Windows platform

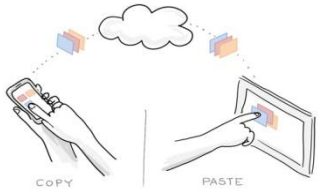

Figure 16: copy & paste technology

SPARSH' lets you conceptually transfer media from one digital device to your body and pass it to the other digital device by simple touch gestures. Our digital world -- laptop, TV, smart phone, e-book reader and all are now relying upon the cloud, the cloud of information. SPARSH explores a novel interaction method to seamlessly transfer something between these devices in a real fun way using the underlying cloud. Here it goes. Touch whatever you want to copy. Now it is saved conceptually in you. Next, touch the device you want to paste/pass the saved content. SPARSH uses touch based interactions as just indication for what to copy, from where and where to pass it. Technically, the actual magic (transfer of media) happens on the cloud.

Cloud computing-

For some computer owners, finding enough storage space to hold all the data they've acquired is a real challenge. Some people invest in larger hard drives. Others prefer external storage devices like thumb drives or compact discs. Desperate computer owners might delete entire folders worth of old files in order to make space for new information. But some are choosing to rely on a growing trend: cloud storage.

While cloud storage[7,8] sounds like it has something to do with weather fronts and storm systems, it really refers to saving data to an off-site storage system maintained by a third party. Instead of storing information to your computer's hard drive or other local storage device, you save it to a remote database. The Internet provides the connection between your computer and the database.

On the surface, cloud storage has several advantages over traditional data storage. For example, if you store your data on a cloud storage system, you'll be able to get to that data from any location that has Internet access. You wouldn't need to carry around a physical storage device or use the same computer to save and retrieve your information. With the right storage system, you could even allow other people to access the data, turning a personal project into a collaborative effort.

III. CONCLUSION

The key here is that these interfaces helps you and letting you access it in any way you want, in the simplest way possible.

Clearly, these devices have the potential of becoming the ultimate "transparent" user interfaces for accessing information about everything around us.

It may change the way we interact with the real world and truly give everyone complete awareness of the environment around us.

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