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A SURVEY ON GESTURE RECOGNITION SYSTEMS

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Abstract - Communicating with computer involves use of touch screens, wireless/wired mouse along with keyboards. In this paper, we propose a "Human Computer Interfacing Device" mapping Hand Gestures, most intuitive communication gesture, to communicate with computers, robots and other household electronic devices. Developments in field of communication have enabled computer commands being executed using hand gestures. This proposed novel solution achieves effective interaction with Internet giving quality feedback, intuitive control with complete mobility.
Keywords: Human Computer Interfacing, Hand gesture technology.

1. INTRODUCTION

In the current era, computers are being integrated into every aspect of our lives (eg. Microsoft Surface and Automated Smart Homes) making it essential to move away from the conventional keyboard/mouse interface and delvepment into intuitive methods of interacting with the computers and other appliances around us. Also, such devices being tools designed to aid humans, it is in our best interests if we can make them adapt to our natural communication patterns rather than otherwise. Human hand gestures are a means of nonverbal interaction among people. They range from simple actions of pointing at objects and moving them around to the more complex ones that express our feelings or allow us to communicate with others. To exploit gestures in Human Computer Interfacing, it is necessary to provide the means by which they can be interpreted by computers.

2. RELATED WORKS

Existing different technologies are

1. Sixth Sense Technology

Sixth Sense is a gestural interface device comprising a neck worn pendant that contains both a data projector and camera. Head worn versions were also built at MIT Media Lab in 1997 that combined cameras and illumination systems for interactive photographic art, and also included gesture recognition (e.g. finger-tracking using colored tape on the fingers). Sixth Sense is a name for extra information supplied by a wearable computer, such as the device called "WuW" (Wear yoUr World) by Pranav Mistry et al., building on the concept of the Tele pointer, a neck worn projector and camera combination first proposed and reduced to practice by MIT Media Lab student Steve Mann.

Pros :

1. SixthSense is a user friendly interface which integrates digital information into the physical world and its objects, making the entire world your computer.
   - SixthSense does not change human habits but causes computer and other machines to adapt to human needs.
   - Supports multi-touch and multi-user interaction.
   - It is an open source and cost effective and we can mind map the idea anywhere.
   - It is portable and easy to carry as we can wear it in our neck.

Cons:

1. Need to adjust the background colours and brightness
2. Projector and mobile device are very expensive.

2. Wired glove

A wired glove (sometimes called a "dataglove" or "cyberglove") is an input device for human–computer interaction worn like a glove. Various sensor technologies are used to capture physical data such as bending of fingers. Often a motion tracker, such as a magnetic tracking device or inertial tracking device, is attached to capture the global position/rotation data of the glove. These movements are then interpreted by the software that accompanies the glove, so any one movement can mean any number of things. Gestures can then be categorized into useful information, such as to recognize Sign Language or other symbolic functions. Expensive high-end wired gloves can also provide haptic feedback, which is a simulation of the sense of touch. This allows a wired glove to also be used as an output device. Traditionally, wired gloves have only been available at a huge cost, with the finger bend sensors and the tracking device having to be bought separately. Wired gloves are often used in virtual reality environments.

3. AcceleGlove

The AcceleGlove instrumented gesture recognition glove ("designated iGlove for DoD/NIH applications") has been developed under SBIR grants from the U.S. Army and Department of Education. The iGlove is a low cost gesture recognition system based on patented technology detecting the individual motions of the finger, hand, wrist, and arm. The iGlove is being further refined under a grant from the National Institutes of Health to assist with physical therapy, and the Office of Naval Research for military hand signal recognition. The iGlove, as a robot controller, uses the

natural movements of the operator's hand/arm as the input device to control both the movement of a robot itself, as well as the movement of ancillary devices such as grasping and lifting arms.

4. Augmented reality
Augmented reality (AR) is a term for a live direct or indirect view of a physical real-world environment whose elements are augmented by virtual computer-generated imagery. It is related to a more general concept called mediated reality in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. The augmentation is conventionally in real-time and in semantic context with environmental elements.

5. Gaze Tracking System
Eye tracking is the process of measuring either the point of gaze (where one is looking) or the motion of an eye relative to the head. An eye tracker is a device for measuring eye positions and eye movement. Eye trackers are used in research on the visual system, in psychology, in cognitive linguistics and in product design. There are a number of methods for measuring eye movement. The most popular variant uses video images from which the eye position is extracted.

6. Computer vision based algorithm
Computer vision is the science and technology of machines that 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. Affection between employed bees and the onlooker bees.

7. x-OSC Gloves
It uses conductive thread and Eeontex fabric for detecting ngerex, and communicates to a host via wifi. It is a curious application of wireless technology, but as the blog reports and this video clearly shows, it does what it is designed to do quote well. Still a di_erent target application than what Im going for with the Keyglove, but a great glove nonetheless.

8. Key Glove
The Keyglove is an innovative new way to interact with your technology. A wearable, wireless, open-source input device, the Keyglove provides unprecedented exibility and convenience for gaming, design, art, music, dataentry, device control, 3D object manipulation, and even inexpensive telep-resence. The Key glove uses customizable touch combinations and gestures to enter text data, control the mouse, switch between applications, perform multiple operations with a single action, and even have some fun with equipping weapons, attacking, and defending in MMORPGs and other games.

9. Clove 2
The Clove 2 is remarkably similar in concept to the Keyglove. It uses the same basic touch combination procedure and allows for full customization through software. However, it only supports 1-to-1 touch combinations, and requires the use of toggled modier keys to achieve most keys (all lowercase letters can be achieved without modiers though). The most remarkable aspect of this glove to me is its use of a Bluetooth interface that is cannibalized from an existing wireless keyboard.

10. Glove Mouse
The Glove Mouse is an MIT project by project by Tony Hyun Kim and Nevada Sanchez which demonstrated intuitive control of a map application using only ones hands. The gloves combine pushbuttons for direct action with a visually distinct _ngertip cap that can be tracked by a webcam to provide mouse cursor control.

11. KITTY
The KITTY input device from kittytech.com is another design. KITTY stands for Keyboard Independent Touch Typing. This is a unique kind of glove device which was originally designed for both hands and made to be easy for people who are already good at touch typing. It is not quite like any of the other above mentioned devices, but it is similar in some ways to the Key glove. The KITTY tries to emulate the QWERTY muscle movements as closely as possible to work with people who already know how to touch type with a real keyboard. As most of the other gloves here, this does not have any mouse control.

12. Peregrine Gaming Glove
The Peregrine is a well-established glove targeted towards the gaming community. It uses variable-position touch detection (likely via a programmable analog voltage range set) and wound stainless steel wires throughout. The glove has 18 touch points and 3 activator pads which can generate over 30 unique operations. It does not have any motion-based mouse control though.

13. Essential Reality P5 Gaming Glove
The P5 Gaming Glove by Essential Reality is an innovative, glove-like peripheral device, based upon proprietary bend sensor and remote tracking technologies that provides users total intuitive interaction with 3D and virtual environments, such as games, websites and educational software.

14. Thumbcode
The Thumbcode glove from Stanford has only buttons on the three segments of each of four fingers, and it achieves multiple combinations by detecting which fingers are touching together.

15. Nintendo Power Glove
The Power Glove is a controller accessory for the Nintendo Entertainment System. The glove has traditional NES controller buttons on the forearm as well as a program button and buttons labeled 0-9. A person presses the program button and a numbered button to input commands, such as changing

the ring rate of the A and B buttons. Along with the controller, the player can perform various hand motions to control a character on-screen.

3. CONCLUSION

We look forward to facilitate rich interactive features which would enable the users to interact and take portability to the next level. Use of smaller packages of the integrated circuits will scale down the size of the device to that of a watch, Thereby improving the portability. To achieve further interactivity with appliances (example, Television), we plan to build interfaces (hardware and software) to act as intermediaries between our device and the appliance; these interfaces will be user customizable in terms of hand gestures and resulting actions, enabling control of appliances**.**

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