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Gesture-controlled user interfaces

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Abstract

This Exploratory paper reveals the technological aspects of Gesture Controlled User Interface (GCUI), and identifies trends in technology, application and usability. It includes the review on the history of gesture controlled user interface. It includes he study upon the different aspects associated with the GCUI such as technology adopted, its users and various kind of applications. It considers GCUI as the most prominent and rich interface for current and future scope.

Keywords Gesture recognition; GCUI; HUI.

1. Literature Review

Moniruzzaman Bhuiyan and Rich Picking in Centre for Applied Internet Research (CAIR), Glyndwr University, Wrexham, UK proposed a review of the history of Gesture controlled user interface (GCUI), and identifies trends in technology, application and usability. Their findings conclude that GCUI affords realistic opportunities for specific application areas, and especially for users who are uncomfortable with more commonly used input devices.

2. Gesture Control System

Gesture control is a way of human communication. Young children easily learn to communicate or understand things through gestures. A gesture is anon verbal communication using a part of the body. In GCUI gesture are used with or without combination of verbal communication. Human can interface with machine without any mechanical interference. In GCUI our body part movements are used interface or command the machine. It is way to create the intelligent environment to control home devices to use in medical facilities or security services. This paper also reviews the different technologies of the gesture control system.

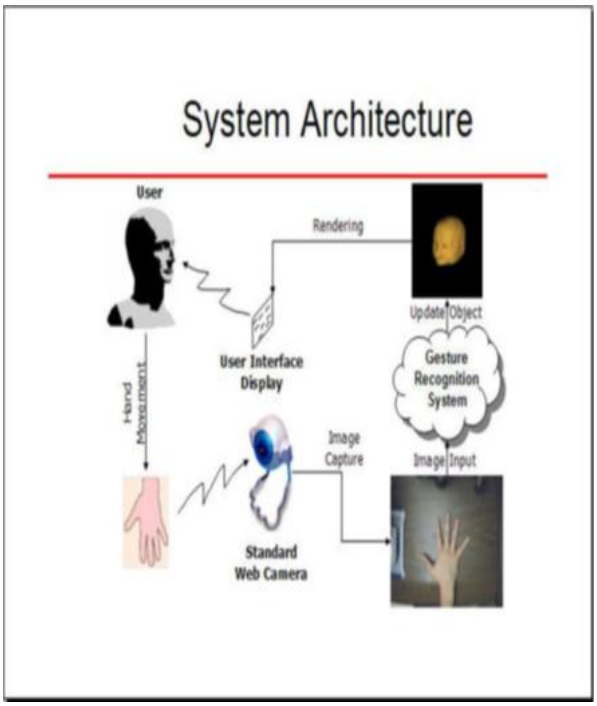
3. Analysis

EEG uses electrodes placed directly on the scalp to measure the weak (5–100 μV) electrical potentials generated by activity in the brain (for a detailed discussion of EEG, see Smith 2004). Because of the fluid, bone, and skin that separate the electrodes from the actual electrical activity, signals tend to be smoothed and rather noisy. Hence, while EEG measurements have good temporal resolution with delays in the tens of milliseconds, spatial resolution tends to be poor, ranging about 2–3 cm accuracy at best, but usually worse. Two centimeters on the cerebral cortex could be the difference between inferring that the user is listening to music when they are in fact moving their hands. We should note that this is the predominant technology in BCI work.

3.1 Type of Gestures

Unlike other interfaces, gesture recognition does not require the user to wear any special equipment or attach any devices to the body. The gestures of the body are read by a camera instead of sensors attached to a device such as a

data glove. In addition to hand and body movement, gesture recognition technology also can be used to read facial and speech expressions and eye movement.



3.2 Users

Researches and surveys are not limited to the users of a limited age group. Initially it was mostly for computer users to work on the objects or presentation. GCUI is applicable to a vast field as an example Wheelchair users are also highly considered for accelerometer based gesture controlled system.

3.3 Technology and Applications

Gesture control is away to replace traditional input providing methods. There is a lot of scope in it to pursue. Initially it was used for feedback and training system but revolution in the mobile phone devices has taken it to new heights. It provides people way to communicate with any media using gesture control interface. Gestures have been captured by using infrared beams, data glove, still camera, wired and many inter-connected technologies like gloves, pendant, infrared signal network server etc in the past. Recent vision technique, video and web cam based gesture recognition has made it possible to capture any intuitive gesture for any ubiquitous devices from the natural environment with 3D visualization. Lenman has developed a prototype for remote control of home electronics, such as TV and CD-player.

There are various types of gestures which can be recognized by the computers:

- Sign language recognition
- Robotic technology
- Direction indicators (pointing)
- Game technology
- Eye gestures
- Facial gestures

4. Current Opportunities For Gesture Technology

Gesture technology can provide more entertainment opportunity for any type of users:

- **Artificial Intelligence.** Gesture based technology can play an important role in our life. Gesture from any part of the body can command the computer or any machine. From day to day life for example room automation to commanding the robot in human computer interaction Based on networking technologies and hand gestures, users can connect multiple devices.

- **Simulation**. Body gesture creates the simulation of human body activities in the screen. Physical simulation can improve the realism of the resulting gestural animation in several ways. Gesture Tek develops a stimulating computer- generated virtual reality therapy world that guides patients through clinician-prescribed interactive rehabilitation exercises, games and activities that can target specific body parts. Patient performance is measured and recorded.
- **Training & Education.** The technology solution can be developed for training and education purpose. In the rehabilitation or fitness centers, it can train people automatically based on the user's profile, body structure. Taking natural input from the body movements is the most important advantage here over mouse or keyboard.

- **Assistive living.** Technologies such as multi-agent systems, safe communications, hypermedia interfaces, rich environments, increased intelligence of home appliances, and collaborative virtual environment are now converging and represents an important enabling factor for the design and development of virtual elderly support community environments.

5. Future Work

Technologies developed based on gesture are now really affordable and converged with familiar and popular technologies like TV, large screen. It's ubiquitous and non-intrusive as we can install a camera or remote with the TV. From this paper we can see the trends of gesture controlled communication systems. Easing of the technology use, affordability and familiarity indicate that gesture based user interface can open new opportunity for elderly and disable people. The older population (65+) numbered 36.3 million in 2004, an increase of 3.1 million or 9.3% since 1994 and it's growing over time. There will be more elderly people and fewer younger ones to care for them. So we need to invest much more heavily in Assistive Living solutions. The research 'A gesture controlled communication aid for elderly and disabled people' can be a significant task for future**.**

6. Conclusion

Gesture recognition can be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines and humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit the majority of input to keyboard and mouse. Gesture recognition enables humans to interface with the machine (HMI) and interact naturally without any mechanical devices.

References

[1] Prof Kamal K Vyas "Gesture control interface".

[2] GCUI Moniruzzaman Bhuiyan and Rich Picking Centre for Applied Internet Research(CAIR), Glyndwr University.

[3] Issa Ashwash, "Eye Gestures Recognitions: A Mechanism for Hands-Free Computer Control".