Abstract

In natural course, human beings usually make use of multi-sensory modalities for effective communication or efficiently executing day-to-day tasks. For instance, during verbal conversations we make use of voice, eyes, and various body gestures. Also effective human-computer interaction involves hands, eyes, and voice, if available. Therefore by combining multi-sensory modalities, we can make the whole process more natural and ensure enhanced performance even for the disabled users. Towards this end, we have developed a multi-modal human-computer interface (HCI) by combining an eye-tracker with a soft-switch which may be considered as typically representing another modality. This multi-modal HCI is applied for text entry using a virtual keyboard appropriately designed in-house, facilitating enhanced performance. Our experimental results demonstrate that using multi-modalities for text entry through the virtual keyboard is more efficient and less strenuous than single modality system and also solves the Midas-touch problem, which is inherent in an eye-tracker based HCI system where only dwell time is used for selecting a character.
References

7. Duchowski A T 2002 A breadth-first survey of eye-tracking applications Behavior Research Methods, Instruments, & Computers 34 455-70
16. Shein, G F 1997 Towards task transparency in alternative computer access: selection of text through switch-based scanning PhD diss., University of Toronto


Špakov O and Miniotas D 2004 On-line adjustment of dwell time for target selection by gaze Proc. of the Third Nordic Conf. on Human-Computer Interaction NordiCHI '04(Tampere) (New York: ACM) pp 203-6


Oviatt S 2003 Advances in robust multimodal interface design IEEE Comput. Graph. Appl. 23 62-8


Prabhu V and Prasad G 2011 Designing a virtual keyboard with multi-modal access for people with disabilities 2011 World Congress on Information and Communication Technologies (WICT) (Mumbai) (USA: IEEE) pp 1133-8


Porta M and Turina M 2008 Eye-S: a full-screen input modality for pure eye-based communication Proc. of the 2008 Symp. on Eye Tracking Research & Applications ETRA ’08


38. The View Point EyeTracker®: http://www.arringtonresearch.com/


42. Abbott W W and Faisal A A 2012 Ultra-low-cost 3D gaze estimation: an intuitive high information throughput compliment to direct brain–machine interfaces J. Neural Eng. 9 046016


**Index Terms**

Computer Science  
Image Processing
Keywords

Multi-modal, eye-tracker, HCI, eye typing, eye-gaze.