The Ergonomics of Attention Responsive Technology

Alastair G. Gale, Kevin Purdy, & David Wooding
Applied Vision Research Centre, ESRI
University of Loughborough, Loughborough, UK

Abstract

ART (Attention-Responsive Technology) is a new three year UK research project which will enable individuals to access technology efficiently in situations where their mobility is either impaired, as a result of disability or age, or because movement is undesirable due to environmental hazards. The system works by monitoring both the individual and the ICT (Information and Communication Technologies) devices (termed here 'objects') in his/her environment and then uses knowledge of the individual's gaze behaviour to determine to which ICT device they are attending. This information is relayed to a user-configurable control panel, which then displays as a graphical user interface (GUI) only those controls that are appropriate, both to the user and to the particular object in question. The user can then choose to operate the object. ART therefore acts as an enabling technology, with the system fully user configurable and able to cater for future developments in technology.

Background

Numerous disabilities seriously restrict mobility but leave saccadic eye movement control intact and so these movements can be used as a communication or a control aid. Systems already exist which afford physically impaired individuals the ability to interact with a computer or other devices using their saccadic eye movements. For instance an individual can 'type' by looking at keys on an on-screen keyboard, or move the computer cursor according to their point of gaze.

Unfortunately, these systems suffer from the so-called 'Midas touch' problem (Jacob, 1990). That is, a system which uses the user's point of gaze to activate controls *directly* is prone to false alarms as the point of gaze is unconsciously drawn to objects which the visual system finds 'interesting'. As a result, users of such systems generally find that such direct eye movement control can be unreliable and fatiguing, which renders the long-term utility of such systems less than ideal.

In order to control numerous objects in the environment typically a complex menu system of some kind is required which encompass all of the potential objects together with their various levels of control. This can either end up as a physically large menu selection display or else a deep menu structure. Neither is ergonomically acceptable.