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A user-centred design approach to electronic mobility devices for the visually impaired

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With the rapid rate of advancements in navigational and object recognition technology, many types of electronic mobility device have been developed for the visually impaired (Roentgen et al., 2008). The devices can be categorised into three main categories: hand-held devices that are aimed at obstacle detection and orientation of obstacles, to ascertain a clear path (e.g. Ulrich & Borenstein, 2001); devices that are essentially navigational systems (e.g. Katz et al. 2012); other devices that are used to communicate direction, distance, and/or a 'map' of the surroundings (e.g. Molton et al., 1998; Filipe et al., 2012). However, most of these either remain in the prototype stage and fail to enter the market, or are unpopular with users, largely due to the design approach being technology-driven as opposed to user-centred. This study has investigated the effectiveness of such devices and the needs of visually impaired people via; a review of literature; conducting focus groups and interviews with users; and circulating questionnaires to relevant healthcare professionals. The study aimed to inform the development of a new device, that uses sensors and actuators attached to headwear (see Figure 1 - note this version was originally aimed at fire officers in smoke environments).

The findings recognised a requirement to detect and communicate physical barriers that visually impaired people face, particularly when outdoors. User needs varied, but commonly highlighted factors included reliability, simplicity of use and training, cost, confidence and not masking other senses. The healthcare professionals had a varying attitude to new technologies with many preferring traditional solutions. They also highlighted the need to tailor any solution to the needs of their clients. The functions, capabilities, and inherent advantages and disadvantages of different technologies have been scrutinised with regard to user needs and the prototype will now be developed further, with these issues in mind.

Figure 1: Early prototype device to aid mobility for the visually impaired

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