User-centred design of smart wheelchairs

Chinemelu Ezeh, University College London

Independent mobility is important for the self-esteem and well-being of people with mobility impairments. People with more severe conditions, who exhibit insufficient upper body strength, are usually given powered wheelchairs, as they can be used with interfaces such as a joystick that requires minimal upper body strength.

A clinical survey was conducted that showed commercially available interfaces are sometimes inadequate for people with severe disabilities to control a powered wheelchair. Designing more accessible wheelchair interfaces requires the combination of user inputs from these interfaces with information from sensors attached to the wheelchair. The sensor attachments to wheelchairs results in the so-called smart wheelchair, which is able to compensate for a user's inability to drive a standard powered wheelchair safely and effectively.

This design effort requires the collaboration of professionals from multiple disciplines, goals and perspectives working together. In particular, the proper design of smart wheelchairs must be centred on both the needs of the end user and those who will purchase the mobility device. Therefore, in our work, we involve wheelchair users, rehabilitation engineers, physiotherapists, occupational therapists and manufacturers. We highlight the role and importance of the different personnel involved in designing a smart wheelchair, and present some of our preliminary results from this ongoing project.

Email: chinemelu.ezeh.14@ucl.ac.uk