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Quote: “This is a very dynamic and exciting time for assistive technologies and for tracking rehabilitation practices.”

Editorial

There are a billion people living with disabilities globally. With an ageing population and the advances in medical care and assistive technologies this number will continue to rise. Assistive technologies such as wheelchairs and orthotics are becoming smarter, frequently embedded with electronics that help to sense, and then help adapt to the user and the environment. This is possible due to the fall in price and miniaturisation of electronics, the increase in battery power, the advances in additive and digital manufacturing as well as a rise in people ‘hacking’ or simply making their own assistive technologies. This is a very dynamic and exciting time for assistive technologies and for tracking rehabilitation practices. However, it also produces challenges.

Sensing technology now allows us to understand how an assistive technology is being used. This can help clinicians better inform their practice and provide more appropriate assistive technologies for people. However, it can also answer the simple question is the assistive technology being used. This is important as a third of assistive technologies are abandoned.

Sensor technology is improving rapidly. Kinematic sensors are now commonly used for measuring activity and increasingly this occurs ‘in the wild’, away from a rehabilitation or clinical setting. Dermal sensors are also coming of age. Aiding the sensor development is the advancement in processing power allowing for more data processing at the site of data capture as well as harnessing cloud computing to detect patterns wishing and between patient groups. However, at the heart of all of the technology advances is the embedding of user-centred design. Understanding how people interact with their technology, when and how it works well or fails in aiding people is essential for success of products.

All of these advances means that people who use assistive technologies are now able to get immediate as well as reflective feedback on their use. The next step will be for people to be able to give feedback to the clinician and system easily and in the moment. This will then allow for data to be linked to direct measures of quality of life of people. A second challenge is to make assistive technologies more accessible to more people. This theme along with the opportunities is

explored by myself and Dr. Dawes in 'Disrupting the world of Disability: The Next Generation of Assistive Technologies and Rehabilitation Practices'. This piece explores both the challenges and opportunities for engineers to utilise advances in manufacturing and sensor technology as well as the rise of the maker movement to change the face of disability.

The rest of the papers explore the use of sensing technologies in clinical settings as well as during every day use. A common theme in the collection presented in this special edition is the measurement of forces and movement. Oyeka et al. describe a new system of inkjet printed body-worn radio frequency identification tags, which are integrated into medical sticking plasters for wireless, long-term monitoring in hospital environments. Monitoring of falls using a new fuzzy logic-based algorithm is presented by Iakovakis et al. The authors explore the role of feedback mechanism to aid activities of daily living. Feedback is essential to aiding rehabilitation and this theme can be seen in Symonds et al., which focuses on the development of a force-sensing hand-rim fro wheelchair users. Carlson et al. explore the muscle and physical interaction forces during lower limb exoskeleton use; while Velero et al. describe the development and use of a novel interfacial pressure and shear sensor for fingertip contact applications' details a new sensor applied to real life situations. The development of a new system to enable functional electrical stimulation for gait training in hemiplegic patients is presented by Watanabe et al.; and Lin aet al. present their system that integrates a flexible sensor and virtual alarm unit for blood leakage detection during dialysis therapy. Finally, Thorpe et al focus on the development of a pervasive assistive technology for people with dementia, importantly developed using a user-centred approach.

These papers as a collection, range from clinical practice papers to engineering design. I hope you enjoy reading this collection, which showcases the engineering advances in assistive technologies and signposts the emerging opportunities open to us to help change the lives of people living with disabilities.