

Animation Script



How wearable tech can combat Parkinson's disease

Professor Fay Horak

To make the most out of this script, you could:

- Stick it in your book as a record of watching Fay's animation
- Pause the animation and make notes as you go
- Add your own illustrations to the sheet
- Create your own animation to accompany it
- Add notes from classroom discussions
- Make notes of areas you will investigate further
- Make notes of key words and definitions
- Add questions you would like answered – you can message Fay through the comments box at the bottom of her article:

www.futurumcareers.com/how-wearable-tech-can-combat-parkinsons-disease

SCRIPT:

Every time we move around, our body controls our upright body orientation and balance, and our walking and limb movements, to move us in the direction we intend to go and to keep us balanced. Most neurological diseases damage this complex process.

At the Balance Disorders Laboratory at Oregon Health & Science University in the US, neuroscientist Professor Fay Horak is investigating how exercise regimes and wearable technologies can help people with Parkinson's disease to regain safe mobility.

Almost all daily activities, such as dressing and walking around the house, require the brain to control balance while turning. Turning involves top-down coordination: first turning the eyes, followed by the head, the trunk and, finally, the legs, while keeping the body's centre of mass within the base of foot support.

To turn, we need 'dynamic balance' – the ability to control the body's centre of mass over a moving base of support. When standing upright, the body centre of mass is just in front of the lower spine, and our base's edges consist of the outer edges of our feet. As we turn, there is a higher chance of our centre of mass going outside the edge of the base – which leads to instability.

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Turning is a complex movement that requires advanced motor planning by the brain and balance adjustments, which are impaired by ageing and neurological disorders, such as Parkinson's disease.

Early symptoms of Parkinson's disease may include subtle changes in walking and balance that can be measured with wearable technology. While there is no cure, it is often possible to improve balance and mobility in people with Parkinson's disease to improve their overall quality of life.

Fay and her colleagues are finding ways to help people with neurological disorders by studying rehabilitation approaches that use new technologies that inform participants about the quality of their movements. For example, they may receive vibratory biofeedback about when their feet touch the floor or about the direction their body center of mass is moving.

While practising turning, patients are supported by a harness suspended from the ceiling, so that they are at no risk of falling, which helps build confidence and eliminate fear of injury.

The team is also investigating whether people can safely and effectively do balance exercises at home, with help from video-based sessions with a physical therapist.

The lab has also created the Agility Boot Camp, where people with Parkinson's disease practise various dynamic balance tasks to help them regain lost abilities, such as being able to talk and walk effectively at the same time. Such programmes can have a profound impact on the quality of life of people with Parkinson's disease and other neurological disorders.

What could you achieve as a neuroscientist?