

Visualising better care

- Researchers use animation to support rehabilitation in £1.5m initiative

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Pioneering research that could improve rehabilitation after stroke, speed up recovery from joint replacements and prevent falls in older people has been launched at the University of Strathclyde in Glasgow.

The £1.5 million project will see engineers, scientists, designers and healthcare professionals from across the UK joining forces with members of the public to convert powerful biomechanical data into simple, computer-generated animations to help patients visualise how their bodies move.

The technology will enable healthcare professionals to communicate movement information that was previously only available in graph or table form, helping patients to improve their own mobility and prevent injury. The system will also improve feedback of results and ultimately, help diagnose patients' physical problems in complex conditions.

The four-year project, led by the University of Strathclyde, is being developed in partnership with The Glasgow School of Art, Glasgow Caledonian University, Glasgow University, Newcastle University, the University of Southampton, and the NHS in the West of Scotland. The project is funded by the Lifelong Health and Wellbeing programme - a cross research council initiative in partnership with the UK Health Departments.

Lead researcher, Professor Phil Rowe of the University of Strathclyde's Department of Bioengineering, said: "A cornerstone of many physical rehabilitation techniques is a biomechanical understanding of the problem and its solution. But the use of biomechanical data has been limited in clinical practice because it is difficult to communicate.

"By using animation, we can 'unlock' biomechanics by enabling patients to visualise a movement, and how it affects their body. Our goal is to improve the effectiveness of rehabilitation by involving patients as fully as possible in their own care and empowering them to manage their own condition.

"We hope also to help prevent injury and illness in our growing numbers of older people by using animation to improve understanding, motivation and adherence to exercise plans."

The team will use the new technology in a wide range of clinical areas including exercise plans for healthy older people, falls prevention, rehabilitation of total knee replacement

patients, early mobilisation of acute stroke patients and enhanced ankle-foot orthoses in late stage stroke patients.

To make the animations, the researchers first capture movement data in the University of Strathclyde's specialist gait laboratory. They use advanced, infra-red cameras to record movement, while measuring each movement's impact on the body with highly sensitive force-plate sensors built into the floor and equipment.

A full biomechanical analysis of the subject in motion is then possible, including timings and symmetry of foot falls, joint angular displacements and estimates of muscle and ligament forces.

This data can then be converted into an animated figure and relevant biomechanical data overlaid for example, green and red markers demonstrating acceptable and unacceptable levels of stress on the body. This area of work will be led by Professor Alastair Macdonald of Glasgow School of Art.

The team also intend to develop portable systems of motion capture and visualisation for use in health centres, the community and the patients own homes. This area of work will be lead by Dr Lynne Baillie of Glasgow Caledonian University.

The system will be trialled with the NHS in the West of Scotland. The research team believes that the dynamic visualisation of movement data has the potential to make a step-change in the clinical usefulness of biomechanics, equivalent to that produced by other medical visualisation techniques such as x-rays, CT and MRI.

The Lifelong Health and Wellbeing (LLHW) initiative is a funding collaboration between the UK's research councils and Health Departments. LLHW funds multidisciplinary research to find out more about what influences health and ageing throughout life.

The Medical Research Council manages the Lifelong Health and Wellbeing initiative on behalf of the funders. For more information see www.mrc.ac.uk/LLHW

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