Neural Models for Personalised Rehabilitation

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Stroke is a major cause of disability in adults. More than 15 million strokes occur every year in the world, and more than 100,000 of these affect patients in the UK. Stroke patients often have an impaired ability to control their upper limbs and need assistance with every-day tasks. Relearning motor skills after stroke is similar to learning new motor skills, for example learning to play tennis, but a problem for stroke survivors is that their impaired movements often restrict the ability to use sensory feedback for re-learning.

Rehabilitation robotics has shown promise to augment the rehabilitation process and to also offer feedback on performance. However, the personalisation of the therapy to individual needs remains a major challenge to date.

The proposed project will use a **computational model of the cerebellum** that is being developed by the Biocomputation Research Group (biocomputation.herts.ac.uk) to optimise robotic rehabilitation for individual subjects. The cerebellum has been optimised throughout vertebrate evolution to become an adaptive controller of biological skeletomuscular structures that is unrivalled by any artificial adaptive motor control algorithm. This has led and is still leading to the development of a rapidly increasing number of computational models of cerebellar learning, and to the successful applications of these cerebellar models to controlling simulated and real robots. The PhD project will involve the development and application of personalised cerebellar models in order to optimise rehabilitation robots for individual subjects.

For further information about this project, please contact one of the proposed supervisors above.