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Digital knee brace aids rehab

TOM DILLANE/Stuff.co.nz

A prototype digital knee brace that instructs you how to correctly perform rehab exercises has been designed by AUT Masters student Arien Hielkema.

Arien Hielkema knows first-hand the frustration of recovering from a major injury when left to your own devices.

Violently knocked from his bike by an oncoming car while training for his first ironman competition, Hielkema tore the posterior cruciate ligament in his knee and found there was a major gap in the rehab treatment.

How do you know you're completing the prescribed exercises correctly when a physio isn't watching?

Arien Hielkema with a 3D printed cast of his knee and electronic joints at AUT University.

"I'm a really motivated sort of person and even I was getting demoralised through those recovery stages," the Aucklander says.

"The exercises they prescribe to you target specific muscle groups and if you're doing it just slightly off the muscles you're trying to strengthen are not going to fire."

Turning his enthusiasm for sporting competition into the medical domain, Hielkema begun a masters of creative technologies at AUT University.

His project aim was to design a synthetic leg brace that could tell you if you were correctly performing a prescribed rehab exercise.

"The concept is you visit the physio, put the knee brace on, the physio will show you the exercises, and that movement profile will be recorded by the brace," Hielkema says.

"You won't see your physio for two more weeks or whatever, but you can load the recorded movement at home.

"Information is sent from the brace to your computer through bluetooth and on the screen it will show you how accurately you're completing the exercise."

Hielkema's considerations during the project were as much about rehab patients' psychological resilience as their physical recovery.

"Research has found that physio exercises are externally placed on an athlete who is traditionally motivated intrinsically by the want to compete and do the best they can," he says.

"As soon as that competitive element is taken away and the external exercises are put on them they don't necessarily understand and frustration comes in.

"This project will hopefully provide a visual driver to get them motivated again."

Although still at the prototype stage, Hielkema has been in talks with AUT Millennium's institute of sport about further developing the brace technology.

"With all these integrated technologies, from smart fabrics to soft circuits and nanofibre technology, the sky's the limit," he says.