Smart Lower Limb Rehab System

The Problem:

Stroke is the leading cause of disability among adults in the United States with more than 4 million Americans currently living with post-stroke after-effects. Presently the nation spends more than $10 billion per year on post-stroke rehabilitation experts such as physical therapists. While researchers have studied upper limb stroke recovery extensively, lower limb rehab solutions are lacking. Furthermore, there is a pressing need for more out-of-clinic, at-home therapy options.

The Solution:

Researchers at The University of Alabama have developed an intelligent, wireless, low-cost sensor system that automatically and accurately measures the quality of physical therapy of the lower limbs. The system uses wireless thermal cameras and pressure sensors around the feet and legs to capture and report motion data, avoiding inconvenient in-person clinic visits Once the data is analyzed, proper exercise suggestions are given, and progress is tracked further. The technology can be integrated with other rehabilitation equipment such as a treadmill by utilizing its home-oriented cyber-physical system

INVENTOR

Dr. Fei Hu
Professor, Electrical and Computer Engineering

Dr. Hu received his Ph.D. in Electrical and Chemical Engineering from Clarkson University in 2002.

His research includes security, signals and sensors, or 3S.

Security: This is about how to overcome different cyber attacks in a complex wireless or wired network. Recently Hu has focused on cyber-physical system security and medical security issues.

Signals: This mainly refers to intelligent signal processing, that is, using machine learning algorithms to process sensing signals in a smart way in order to extract patterns, i.e., pattern recognition.

Sensors: This includes micro-sensor design and wireless sensor networking issues.

He has published over 200 journal/conference papers and books. His research has been supported by the National Science Foundation, Cisco, Sprint and other sources.

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Benefits:

- Automatically tracks rehabilitation progress without clinic visits
- Provides highly accurate training data
- Cost-efficient at-home solution
- Easily integrated with other e-rehab systems