Electromechanical Force-Magnitude, Force-Angle Sensor

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Technology description

UW-Madison researchers previously described a piece of exercise equipment for rehabilitation of stroke patients and sport-specific training of athletes that allows users to measure and train the magnitude and direction of the force generated with the leg (see WARF reference number P05358US). UW-Madison researchers have now developed an improved, less expensive force sensor for that device. The new sensor measures force direction from the orientation of a mechanical linkage between a pedal and the base. The linkage moves like a weathervane—always aligning itself with the force. This increases accuracy and simplifies measurement of force direction and magnitude.

The orientation of the linkage is measured to obtain force direction, while strain gages are only used along a single axis to determine force magnitude. This design eliminates several problems inherent in existing multi-axis strain gage systems, such as the need for multiple strain gages along multiple axes, the complex vector mathematics required to use them, the difficulties of calibrating the strain gages and the inaccuracies caused by cross-talk between sensors.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved, less expensive force sensor.

Additional Information

For the inventors' previous exercise equipment, see WARF reference number P05358US.
http://www.warf.org/technologies/summary/P05358US.cmsx

Application area

Rehabilitation of stroke patients
Training for high performance athletes, particularly bicyclists

Advantages

Compact
Less expensive than current devices

Less complex than currently available devices
Accurately measures direction and magnitude of force
Does not exhibit inaccuracies due to sensor cross-talk
Eliminates need for multiple force sensors, which must be calibrated with each other

Institution

Wisconsin Alumni Research Foundation

Inventors

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