

MiniSun – IDEEA Information

Overview of IDEEA

Mobility is a fundamental part of human life. Automation and modernization in the past 30-50 years has dramatically reduced the amount of daily physical activity, and completely changed our life style and work environment. Sudden changes in physical activity can lead to body imbalance (e.g., energy imbalance) and diseases such as obesity, cardiovascular dysfunction, and diabetes.

On the other hand, tremendous progress in microelectronics and computers in the last 5-8 years rendered the unique opportunity to design intelligent devices that can accurately monitor physical activities/exercise and provide guidance for the appropriate amount and type of these activities.

Research work from Dr. Sun and other scientists revealed that more than 90% of major daily physical activity involves hips and legs, which has +80% of body muscle mass.

This motivated the design and production of **Intelligent Device for Energy Expenditure and Activity (IDEEA)**, a microprocessor-based device that provides the ability to collect and analyze data for body motion, daily physical activity/exercise and other events in a free-living situation on 24-hr basis. Thanks to years of research work, a unique combination of database and knowledge base has been set up by the company that encompasses the large entries of the most accurate data for human physical activities and energy expenditure on daily basis. This unique database enables us to teach the IDEEA in identifying and computing various types of physical activities and human performance with high intelligence and accuracy. At present, IDEEA can provide objective and scientific information regarding the diagnosis and treatment of a variety of diseases, as well as physical performance.

The IDEEA has the following major functions:

- ◆ Records body movement and posture changes on 24-hrs basis, stores tens of millions of data points for future analysis.
- ◆ Identifies a variety of activity types, including reclining, sitting, standing, carrying weight, walking, jogging, ascending stairs, descending stairs, running, cycling, and jumping. There are sub-types among each category, bringing a total of more than 40 differentiable types of activity/exercise.
- ◆ Provides accurate recordings of the onset, duration, and frequency of these activities and other important events of the day, perform detailed analysis of category and distribution of these activities in any given period of time (such as on hourly or daily basis).
- ◆ Computes the amount and intensity (for example, the speed of walking or running) of many of these activities using the state-of-art methods/techniques such as artificial

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intelligence and neural-network, providing the most accurate results ever reported for a portable device.

- ◆ Provides both instantaneous and cumulative estimates of power, amount of mechanical work, and energy expenditure at any given period, up to 24-hours or longer with highest possible accuracy in a free-living condition. These data are critical for weight control and obesity treatment, for fitness/wellness training programs, and for rehabs/functional evaluation.
- ◆ Calibrated results through a series tests using the most advanced equipment, including the floor-sized precision force platform, and the most accurate whole-room calorimeter (see publications below). The IDEEA product had been clinically tested on hundreds of volunteers and patients with thousands of testing hours.

Sun, M and JO Hill. "A method for measuring mechanical work and work efficiency during human activities." *Journal of Biomechanics* 26(1993):229-241.

Sun, M, GW Reed, JO Hill. "Modification of a whole-room calorimeter for measurement of rapid changes in energy expenditure." *Journal of Applied Physiology* (1994): 2686-2691.

*Briefly, IDEEA identifies various physical activities, a characteristic that no other available scientific testing device is able to attain. Another unique feature of IDEEA is its ability to provide information about the duration and frequency of physical activities. The amount, quality, and accuracy of scientifically useful information received from IDEEA are astounding. The device computes the amount and intensity of variety activities with high frequency and precision and allows reviewing of results almost instantly. These data are the basis for calculating energy expenditure and its components, which are necessary elements in asserting short and long-term energy balance in humans. Having such information will allow scientists and clinicians working in the area of obesity, to better understand the interrelationship between physical activity and body weight. **This could lead to designing better weight control programs focusing on physical activity.***

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