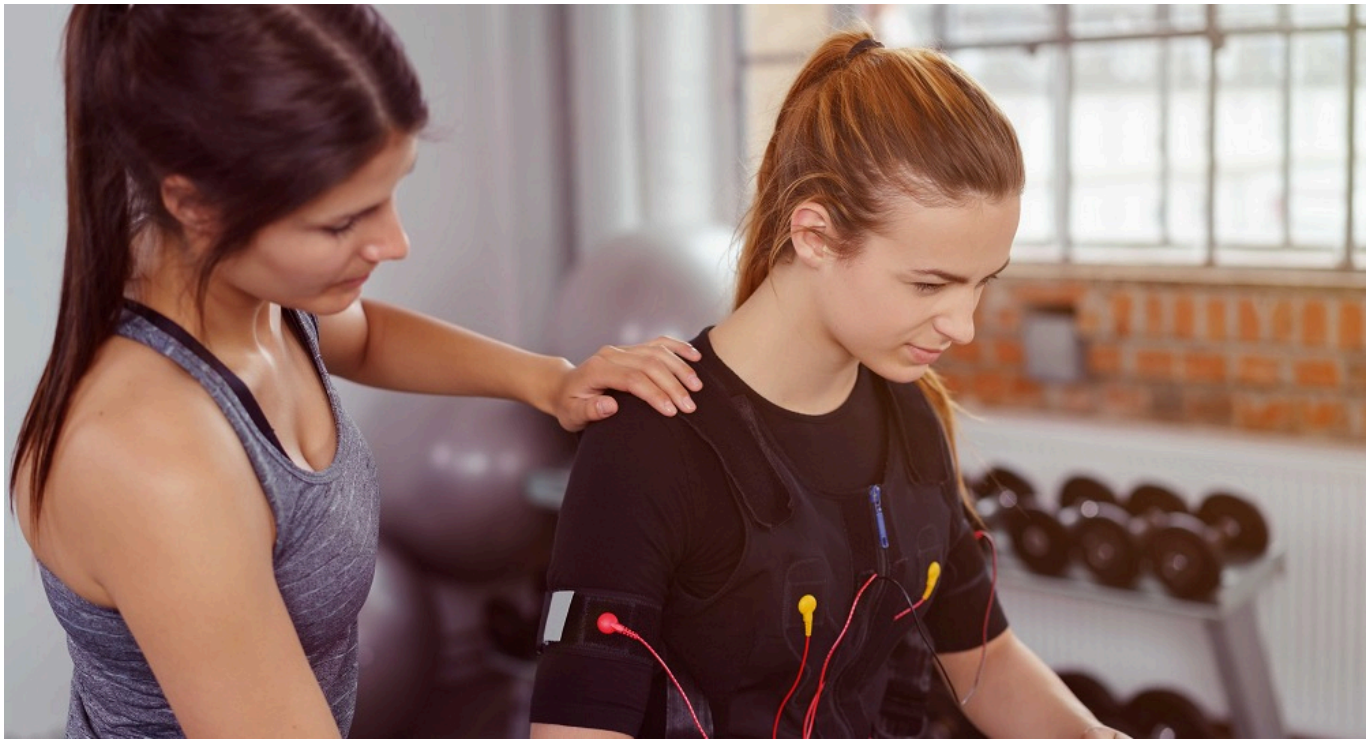
TECH OFFER

Wearable Soft Actuator-Sensor System for Muscle Assessment



KEY INFORMATION

TECHNOLOGY CATEGORY:
Healthcare - Medical Devices
Healthcare - Diagnostics
Electronics - Actuators
Electronics - Sensors & Instrumentation

TECHNOLOGY READINESS LEVEL (TRL): TRL5
COUNTRY: SINGAPORE
ID NUMBER: TO175006

OVERVIEW

This innovative wearable device, integrating an actuator and a sensor, addresses a pressing issue in the field of neuromuscular disease diagnosis and management. By enabling in vivo measurements of muscular elasticity and employing machine learning models for disease severity evaluation, it offers an objective and accessible solution. The wearable conforms to the human body, facilitating quantitative assessments by correlating elastic moduli with voltage amplitude, thereby eliminating the subjectivity of traditional assessments. It significantly enhances accessibility, breaking down barriers to muscle assessment, and introduces a remote monitoring capability that allows continuous tracking of muscle health during rapid joint stretches. This technology serves medical professionals, patients with neuromuscular diseases, and rehabilitation centers by providing a reliable tool for improved diagnosis and personalized treatment plans. In summary, this wearable device represents a transformative approach to assessment of muscle-related pathophysiological conditions, offering objectivity, accessibility, and remote monitoring, ultimately enhancing the quality of care and treatment outcomes.

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TECHNOLOGY FEATURES & SPECIFICATIONS

The core components of the system include a pneumatic actuator for controlled mechanical force generation, a piezoelectric sensor to measure muscle response, and integrated machine learning models for disease severity evaluation. The system is designed to seamlessly conform to the human body, its wearability ensures patient comfort and enables a point of care continuous monitoring of muscle health, a groundbreaking advancement in the field of muscular biomechanics assessment.

POTENTIAL APPLICATIONS

This technology offers a wide array of potential applications spanning various industries. In the healthcare sector, it can help with the diagnosis and treatment of neuromuscular diseases and find use in tele-rehabilitation programs. Athletes and sports professionals can benefit from improved performance and injury prevention. This technology could help in creating customized rehabilitation equipment designed for specific patient needs and conditions, making the recovery process more effective and personalized. Routine muscle health assessments can be realized, promoting proactive healthcare management across the board.

MARKET TRENDS & OPPORTUNITIES

The booming wearable market and recent advances in material science has led to the rapid development of the various wearable sensors, actuators, and devices that can be worn, embedded in fabric, accessorized, or tattooed directly onto the skin. Wearable actuators, a subcategory of wearable technology, have attracted enormous interest and many wearable actuators and devices have been developed in the past few decades to assist and improve people's everyday lives. In addition, The global diagnostic wearable medical devices market size is estimated to grow by USD 7,333.3 million at a CAGR of 15.2% between 2022 and 2027. (Source: Technavio).

UNIQUE VALUE PROPOSITION

The system provides a substantial improvement over the current state-of-the-art in muscular biomechanics assessment. Unlike existing methods that are either subjective and qualitative or hindered by bulky, stationary instruments, this system introduces **a precise, objective, and patient-friendly solution**. Its wearability, facilitated by a soft textile-based cuff, **enables point-of-care assessments and home-based monitoring,** dramatically **enhancing accessibility and convenienc**e.

Furthermore, **with dynamic movement analysis it can providing valuable insights into muscle behaviour during real-world activities**, a dimension largely unexplored by current techniques. These position the system as a transformative technology, poised to revolutionize the diagnosis and management of neuromuscular diseases and expand the horizons of muscular biomechanics assessment.