TECH OFFER
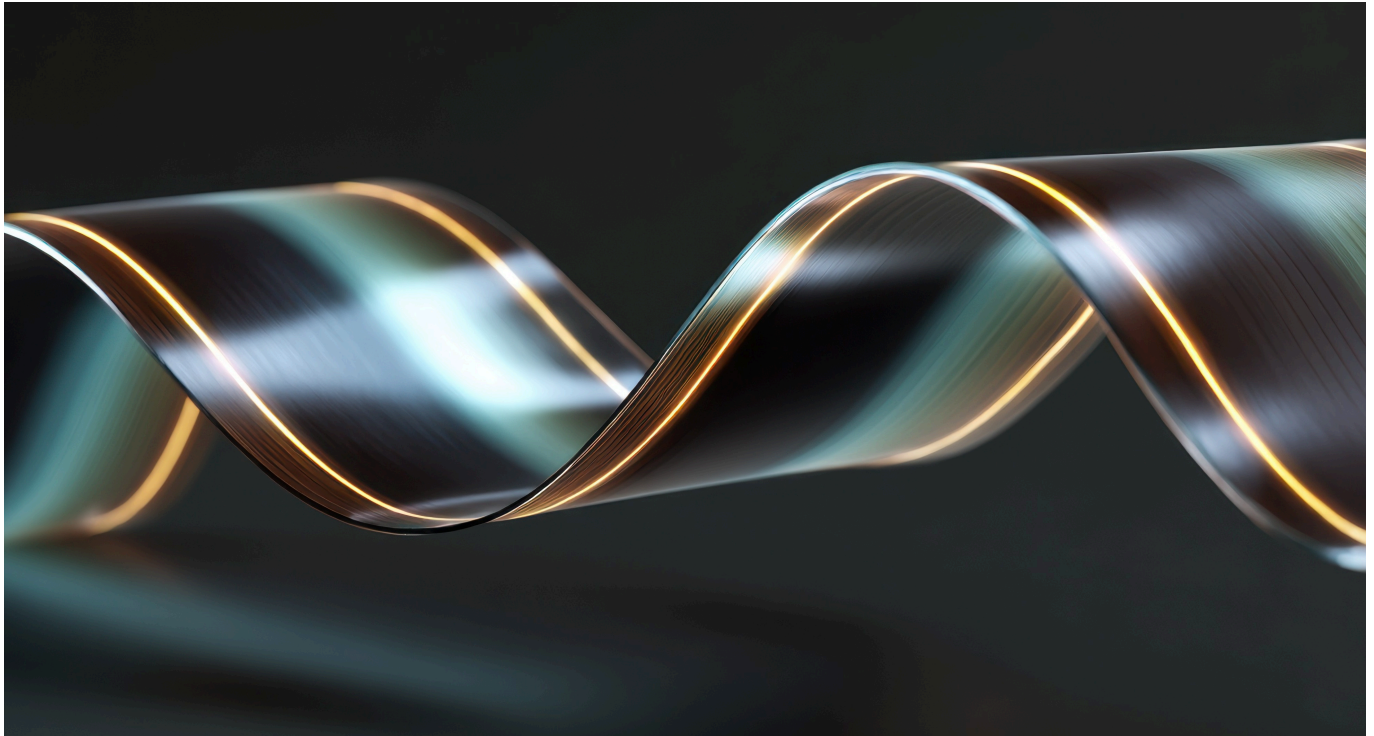
Advanced Flexible Sensor for Accurate, Drift-Free Motion Tracking

KEY INFORMATION

TECHNOLOGY CATEGORY:

Electronics - Sensors & Instrumentation

Healthcare - Medical Devices

Infocomm - Augmented Reality, Virtual Reality & Computer-Simulated Environments

Infocomm - Wearable Technology

Infocomm - Robotics & Automation

TECHNOLOGY READINESS LEVEL (TRL): TRL7
COUNTRY: SINGAPORE
ID NUMBER: TO175375

OVERVIEW

This flexible sensor technology enables precise detection of **angular displacement** and **bending** within a lightweight, thin, and conformable form factor.

Available in both one-axis and two-axis versions to suit different motion sensing needs, the sensors operate on differential capacitive measurement, delivering zero-drift performance for high stability and long-term reliability.

Engineered using advanced material technologies, this sensor platform features a thin, low-profile construction with skin- and fabric-compatible adhesion, making it ideal for seamless integration into wearables, human-machine interfaces, and motion

tracking systems. Its high durability supports repeated bending cycles, while customizable geometries allow tailored solutions for diverse application needs, enabling real-time motion insights.

This technology is well-suited for collaboration with a wide range of partners, including medical and rehabilitation centers, sports and fitness companies, robotics and exoskeleton developers, AR/VR interface designers, infrastructure solution providers, and research institutions. The preferred mode of engagement is R&D collaboration, aimed at co-developing and adapting the sensor platform to meet specific industry or application needs.

TECHNOLOGY FEATURES & SPECIFICATIONS

This advanced flexible sensor technology is built with highly flexible, soft silicone elastomer that allows unrestricted bending while maintaining resistance to water and extreme temperatures. Custom designs are available to meet the specific needs of advanced sensing applications.

The one-axis sensor can simultaneously measure **bending** and **stretch** by measuring capacitance changes due to sensor deformation. Built with layered insulating and capacitive materials, it ensures consistent and repeatable outputs even under dynamic conditions.

The two-axis sensor captures **bending in two directions** using a similar capacitance-based approach. It enables high-resolution angle tracking across flexible axes, supporting use cases such as joint monitoring, gesture recognition, and movement analysis.

The device is designed to measure angular displacement with a high degree of precision, offering a repeatability of 0.18°. It operates with very low power consumption, requiring approximately 1 milliwatt. In terms of durability, the device is capable of withstanding over 10,000 bending cycles, ensuring long-term performance. It features a slim profile with a thickness of just 1.3 millimeters and supports a bending range from 0° to 180°, making it suitable for applications requiring flexible motion detection.

POTENTIAL APPLICATIONS

The wearable sensor market is expected to exceed USD 3 billion by 2028, driven by rising demand for advanced motion sensing across industries. With its thin profile, flexibility, durability, and real-time responsiveness, this technology offers scalable, customizable solutions that outperform rigid sensors. Beyond wearables, its adaptability supports a wide range of modern, connected applications. Key use cases across multiple sectors are outlined below.

Healthcare/Rehabilitation

The sensors enable real-time joint angle and posture monitoring, supporting applications such as smart rehabilitation braces, posture-correcting wearables, and gait-tracking insoles. They also power fall-detection patches for elderly care, providing accurate, continuous motion data for rehabilitation and patient safety.

Sports and Fitness

The sensors enable precise motion tracking to optimize performance and reduce injury risk. Their flexibility and low-profile design make them ideal for seamless integration into wearable athletic gear and smart textiles.

AR/VR

The sensors enable gesture recognition and motion-based control for intuitive human–machine interaction, including finger

movement detection in VR gloves and gesture-responsive control in AR/VR interfaces.

Robotics

The sensors monitor joint articulation in exoskeletons and soft robotics, enabling precise motion tracking and embedded control. They also support movement monitoring and anomaly detection in industrial robots.

Infrastructure

The sensors detect structural deformation in bridges, buildings, tunnels, and other infrastructure.

UNIQUE VALUE PROPOSITION

This technology delivers an ideal balance of comfort, precision, and durability, outperforming conventional systems for wearable and real-time sensing applications.

- Unlike traditional flex sensors, this sensor technology produces repeatable and precise angular output regardless of path, bending radius, or strain.
- Due to its flexibility, thinness, and compact size, the sensor is suitable for measuring both small and large deformations across various objects and surfaces. Its compact form enables unobtrusive integration without restricting the natural movement or deformation of objects.
- Capable of instantly capturing complex motion and deformation for real-time display and rapid data access. Even when implemented on a moving object, the sensors can accurately measure without speed dependency.
- Constructed with silicone elastomer for adaptability in a wide range of environmental conditions. Capable of monitoring targets in environments where optical systems like cameras are ineffective.