

FROST & SULLIVAN

XSENSOR

2022
TECHNOLOGY
INNOVATION
LEADER

NORTH AMERICAN
SENSOR TECHNOLOGY
IN MEDICAL DEVICES INDUSTRY

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each Award category before determining the final Award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company XSENSOR excels in many of the criteria in the sensor technology in the medical devices space.

AWARD CRITERIA	
<i>Technology Leverage</i>	<i>Business Impact</i>
Commitment to Innovation	Financial Performance
Commitment to Creativity	Customer Acquisition
Stage Gate Efficiency	Operational Efficiency
Commercialization Success	Growth Potential
Application Diversity	Human Capital

XSENSOR

Founded in 1996 and headquartered in Canada, XSENSOR is a developer of pressure imaging systems. Powered by its proprietary technology, Intelligent Dynamic Sensing (IDS), the company helps its customers deliver products with matchless comfort, safety, quality, and performance by collecting, visualizing, and accurately evaluating the pressure data between two surfaces in contact. Serving a top global client base, it operates in several markets - including engineering design, manufacturing, healthcare, sleep improvement, and human performance.

In 2021, Frost & Sullivan recognized XSENSOR for its commitment to creativity, customer focus, and growth potential and remains impressed with the company's continuing innovation and sustained leadership.

Creativity and Innovation Fuel Technology Leadership

Backed by world-class subject matter experts, XSENSOR developed IDS over the last 25 years. The company refined its holistic approach to sensor technology, continuously building its capabilities to bridge industry gaps. Beyond the medical devices category, its solutions cater to building pressure sensing systems for several products, including safety and design testing (for the automotive industry), and sleep improvement, helping retail consumers find the right mattress .

XSENSOR's products are also usable for continuous skin monitoring (used in patient care for pressure ulcer prevention) and human performance (for clinical and out-of-the-lab gait and motion application).

Accurately estimating surface performance is difficult. Moreover, combining dynamic sensor data (from motion and images) heightens the challenge. To resolve the issue, XSENSOR built its proprietary IDS technology to maximize performance sensing by gathering highly accurate pressure from static and dynamic surfaces. IDS provides matchless visualization quality and real-time data measurement, resulting in rapid data review with precision imagery. Furthermore, continuous innovation related to artificial intelligence (AI) and machine learning (ML) capabilities enables the platform to offer expedited AI-powered data analysis and optimization. It allows sensors to adapt, alert, and react with the help of AI.

Reliable, Scalable, Flexible

XSENSOR's platform scales to fit customer-specific needs. It offers scalability and flexibility that enable high-end measurement accuracy, repeatability, and speed, revolutionizing the market. The company's sensors offer matchless stability and ensure hundreds of recordings and long-duration testing without recalibration. Simultaneously, the highly reliable sensors prevent failure even after multiple cycles. They offer repeatability of 3% full-scale after 100,000 cycles.¹ Frost & Sullivan points out that another unique element of the ultra-thin sensor is its flexible buildup, allowing precise evaluation across complex contours and surfaces.

The scalable sensors are available in various sizes, resolutions, and calibrated pressure. The sizes range from ultra-small (measures finger contact pressure or medical probe forces) to ultra-large (measures enormous mining tires). With the ability to analyze at the highest resolution (as fine as 1.1 millimeters up to over 2 meters), the highly durable sensors support the broadest pressure measurement range from 0.1 to 500 pounds per square inch.²

High technology reliability, stability, and scalability result in high-quality sensor data, securing customers' trust and a market-leading reputation.

Product Roadmap

IDS' evolved platform capabilities enable a software-as-a-service model and mobile and cloud functionalities. Furthermore, by incorporating AI and ML into its systems, XSENSOR provides additional value to its clients. Its dedication to innovation allows it to transform into a data-driven company and scale to new markets seamlessly.

The company's product roadmap utilizes its standard IDS technology for various new applications. For example, usable for continuous skin monitoring, XSENSOR's predictive technology enables pressure injury prevention and improves patient safety in hospital beds, operating rooms, and wheelchairs by providing physicians visibility into sustained pressure areas to augment patient care. Its ForeSite™ Intelligent Surface mattress is an AI-powered continuous skin monitoring solution allowing physicians to offer personalized

¹ <https://www.xsensor.com/solutions-and-platform/sensors>

² Ibid

care and limiting the clinical staff's workload. The company is making substantial progress in determining the actual body position on the mattress based on its two-dimensional sensor image. The information then transposes into analysis related to tracking the pressure over time (pressure exposure) on specific body parts.

“XSENSOR aims to extend the intelligent information (aggregated from hospital beds) to new applications, including remote patient monitoring in at-home care settings. Similarly, it envisions utilizing real-time pressure data analysis for sports performance remote monitoring (and shoe design) and clinical applications, such as diabetic foot injury prevention. Remotely managing pressure injury prevention can limit hospital admittance and save costs.”

**- Siddharth Shah,
Research Manager**

Nearly 1,500 sensor cells on the mattress surface measure patient body surface pressures and real-time data for continuous monitoring.³ XSENSOR aims to extend the intelligent information (aggregated from hospital beds) to new applications, including remote patient monitoring in at-home care settings. Similarly, it envisions utilizing real-time pressure data analysis for sports performance remote monitoring (and shoe design) and clinical applications, such as diabetic foot injury prevention. Remotely managing pressure injury prevention can limit hospital admittance and save costs.

The company's AI capabilities turn sensor data into easy-to-interpret actionable insights for humans. Intelligent surface dynamic sensors can collaborate and share information with other sensors. These data aggregate in the cloud privately and securely and are usable for application learning, driving insights, identifying errors, and predicting outcomes.

Frost & Sullivan identifies XSENSOR's system as a groundbreaking technology. Its strong intellectual property portfolio of over 25 patents (issued and some pending) upholds its pioneering technology, adding value relative to its growth potential, thus securing a competitive advantage.

Commercial Success

Since its launch, XSENSOR has grown to a customer base of over 1,650 clients in 60 countries. Its notable customer brands include 3M, Medtronic, Toyota, GE, the Mayo Clinic, and Bridgestone. Its world-class AI expert team collaborates with a well-known Canadian University to enhance the AI algorithms associated with pose and position detection on the surface.

The company's total addressable market (TAM) ranges across billions of dollars for all its market categories combined and it is continuously growing. For example, the hospital segment alone displays a massive TAM potential, accounting for billions of dollars. XSENSOR considers extending its pressure injury prevention technology for connected care (non-contact vital monitoring and moisture detection and management) to the consumer smart bed space for sleep improvement (sleep tracking, temperature regulation, and heart rate monitoring).

³ (<https://blog.xsensor.com/stage-one-pressure-sores/>)

Progressing in its growth trajectory, the company's system catering to the pressure injury prevention segment is now in the cloud to provide ForeSite intelligent services. For instance, the ForeSite Intelligent Surface offers direct and real-time feedback, enabling physicians to educate patients and advise on beneficial pressure relieving techniques. XSENSOR is aggregating and analyzing millions of data points from ongoing clinical trials (of its intelligent surface solutions and mattresses) to validate the technology clinically and drive its adoption.

The company's innovative sensor technology has benefitted its clients quite substantially, earning significant trust. For example, its mattress recommendation system in the sleep improvement category is noteworthy. The solution propels a matchless personalized buying experience and drives the retailer's store performance. A case in point, after implementing the REVEAL technology (branded as the SleepCast Mattress Fitting system), the United States-based Boulevard Home Furnishings witnessed a more than 25% rise in sales and a 20% decrease in returns by the end of the first year of technology implementation.⁴

"There's no question about it, our sales went up over 25% in a time when industry sales were not going up, it was flat. Our return percentage went down 12%, it was an immediate impact."

-Jerry Thomas, Director of Sales, Boulevard Home

Additionally, XSENSOR experienced significant success in the human performance solutions category. Its

"The company's data-driven approach and predictive analytics capabilities for patient care enable preventive strategies delivering extensive value to its customers. For example, the ForeSite Intelligent Surface helps mitigate hospital-acquired pressure injuries. Moreover, AI-powered individualized patient monitoring and care plans enable physicians to evaluate risks in real time for appropriate decision support."

**- Supriya Lala,
Best Practices Research Analyst**

Intelligent Insoles resolve the challenge of accurately measuring plantar pressure and analyzing gait in an outside-lab environment. Evaluating natural speed is typically difficult due to the lack of real-world testing solutions. The insoles capture lab-quality biomechanical and human performance data in the field, including tracking the foot's position in space, velocity, and acceleration in real-time and synchronizing it with pressure information. In clinical application, the data can help physicians study surgical or therapeutic strategies. Real-time feedback can assist recovery plans for patients with foot pain or at risk for diabetic foot ulcers. The market-differentiating product functionalities provide XSENSOR with a

competitive edge, positioning it as a trusted partner.

Innovative Technology Provides Sustainable Leadership

With its customer-led strategy, XSENSOR consistently brings to market best-in-class products. The company's data-driven approach and predictive analytics capabilities for patient care enable preventive strategies delivering extensive value to its customers. For example, the ForeSite Intelligent Surface helps mitigate hospital-acquired pressure injuries.

⁴ https://assets.website-files.com/5ff8edac57384b3313f01e7e/61bcda11555ee3862fabe0cf_REVEALByXSENSOR_CaseStudy_BoulevardHomeFurnishings_122021.pdf

Moreover, AI-powered individualized patient monitoring and care plans enable physicians to evaluate risks in real time for appropriate decision support.

By preventing pressure injury through its skin monitoring technology, XSENSOR benefits patients and improves care outcomes by limiting the severity and chances of pressure injuries. Simultaneously, it propels significant cost savings for care facilities and reduces the burden on the healthcare systems, many of whom depend on manual work by nurses and caregivers to prevent sores. Centralization of surface tracking information at a dashboard allows nurses to prioritize care and offers individualized care for patients at risk of pressure injuries.

The company's data, insight, and alert systems facilitate quick patient repositioning to avoid pressure injury while lowering the care team's time and effort. Similarly, its Insoles solution for human performance measurement provides gait analysis which is vital to support athletic coaches and sports professionals in improving performance or preventing injury.

Overall, XSENSOR's AI-enabled sensor data offers valuable insights enabling customers to develop safer products, optimize human performance, and enhance the comfort and quality of human life. This approach bolsters customer satisfaction and acquisition. It strengthens its customer base through peer referrals and new product introductions. The company connects with key opinion leaders in the pressure injury prevention space. It also targets its technology in suitable applications and sites to gain relevant experience to replicate it in larger markets. XSENSOR focuses on educating its customers about the benefits of the technology advancements to the care pathway for patients, reinforcing customer loyalty.

At the same time, the company incorporates customer feedback into its product roadmap to maximize short-term growth opportunities while providing a path to future revenues. Though evolving from a technology standpoint, XSENSOR never loses sight of its customers' perspective. The company continues to learn from customer challenges to design innovative products. It operates a custom solutions division to offer tailored solutions per customer needs. Its brand maintains its regional presence while meeting customer-specific needs.

The company introduced new products and gained pilot programs even during the challenging COVID-19 times, garnering traction from the healthcare industry and experiencing notable success in the foot and gait business line.

Given today's landscape, Frost & Sullivan believes that XSENSOR is in a prime position to increase its market share in the highly competitive sensor technology for medical devices segment.

Conclusion

Technology is a critical success factor for sensor technology in the medical devices industry. Yet with many options available, market stakeholders need to leverage the most appropriate and best technology-based solutions to optimize their market impact. With its Intelligent Dynamic Sensing (IDS) technology, XSENSOR delivers products for engineering design, manufacturing, healthcare, sleep improvement, and human performance.

The IDS platform accurately collects, visualizes, and measures pressure data between two surfaces in contact to eliminate the chances of pressure injury. It enables preventive care resulting in cost savings to the healthcare economy and reducing the staff burden. Additionally, the company's technology improves patient care outcomes by propelling individualized care.

XSENSOR stands out from competitors based on its commitment to innovation and creativity while achieving commercial success. It incorporated artificial intelligence (AI) and machine learning capabilities into its platform, expediting AI-powered data analysis and optimization and enabling its sensors to adapt, alert, and react. The company experienced high growth fuelled by its unique solutions for pressure injury prevention, human performance (Intelligent Insoles), and sleep improvement (mattress recommendation system REVEAL).

With the IDS platform integrated into the cloud, XSENSOR gears to provide ForeSite intelligence services in the continuous skin monitoring segment. Simultaneously, its product road map utilizes IDS for new applications in remote patient monitoring for at-home care settings, remote sports performance measurement, and other clinical use cases such as diabetic foot injury prevention.

With its strong overall performance, XSENSOR earns the Frost & Sullivan's 2022 North American Technology Innovation Leadership Award in the sensor technology in medical devices industry.

What You Need to Know about the Technology Innovation Leadership Recognition

Frost & Sullivan's Technology Innovation Leadership Award recognizes the company that has introduced the best underlying technology for achieving remarkable product and customer success while driving future business value.

Best Practices Award Analysis

For the Technology Innovation Leadership Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

Technology Leverage

Commitment to Innovation: Continuous emerging technology adoption and creation enables new product development and enhances product performance

Commitment to Creativity: Company leverages technology advancements to push the limits of form and function in the pursuit of white space innovation

Stage Gate Efficiency: Technology adoption enhances the stage gate process for launching new products and solutions

Commercialization Success: Company displays a proven track record of taking new technologies to market with a high success rate

Application Diversity: Company develops and/or integrates technology that serves multiple applications and multiple environments

Business Impact

Financial Performance: Strong overall financial performance is achieved in terms of revenues, revenue growth, operating margin, and other key financial metrics

Customer Acquisition: Customer-facing processes support efficient and consistent new customer acquisition while enhancing customer retention

Operational Efficiency: Company staff performs assigned tasks productively, quickly, and to a high-quality standard

Growth Potential: Growth is fostered by a strong customer focus that strengthens the brand and reinforces customer loyalty

Human Capital: Commitment to quality and to customers characterize the company culture, which in turn enhances employee morale and retention

About Frost & Sullivan

Frost & Sullivan is the Growth Pipeline Company™. We power our clients to a future shaped by growth. Our Growth Pipeline as a Service™ provides the CEO and the CEO's growth team with a continuous and rigorous platform of growth opportunities, ensuring long-term success. To achieve positive outcomes, our team leverages over 60 years of experience, coaching organizations of all types and sizes across 6 continents with our proven best practices. To power your Growth Pipeline future, visit Frost & Sullivan at <http://www.frost.com>.

The Growth Pipeline Engine™

Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.

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Key Impacts:

- **Growth Pipeline:** Continuous Flow of Growth Opportunities
- **Growth Strategies:** Proven Best Practices
- **Innovation Culture:** Optimized Customer Experience
- **ROI & Margin:** Implementation Excellence
- **Transformational Growth:** Industry Leadership



The Innovation Generator™

Our 6 analytical perspectives are crucial in capturing the broadest range of innovative growth opportunities, most of which occur at the points of these perspectives.

Analytical Perspectives:

- **Mega Trend (MT)**
- **Business Model (BM)**
- **Technology (TE)**
- **Industries (IN)**
- **Customer (CU)**
- **Geographies (GE)**

