

FROST & SULLIVAN

*SPARTAN RADAR*

**2022**  
**TECHNOLOGY**  
**INNOVATION**  
**LEADER**

*NORTH AMERICAN*  
*4D RADAR FOR*  
*AUTOMOTIVE 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. Spartan Radar excels in many of the criteria in the four-dimensional (4D) biomimetic radar for automotive 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

### Commitment to Innovation

Most radar technologies available in the market, such as two-dimensional (2D), three-dimensional (3D), and other multiple-input multiple-out (MIMO) radars, have limitations. With few transmitting channels,

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*– Krithika Shekar,  
Senior Research Analyst*

the radars cannot carry out long-range sensing to a large extent and measure parameters beyond three dimensions. As a result, they have low accuracy in environmental perception. Vehicles need advanced driver-assistance systems (ADAS) with stronger radar technologies capable of accurate long-range sensing and quick, low-latency information processing for effective autonomous driving.

Spartan Radar is an automotive radar solutions provider founded in 2020 in Greater Los Angeles, United States. The company aims to overcome the challenges with its Biomimetic Radar™ that mimics

human perception, which relies on contextualization and focus for processing. Spartan Radar achieves real-time vehicle perception through an effective combination of hardware and software, edge intelligence and artificial intelligence (AI), and integrated firmware to enhance data security.

Biomimetic Radar™ uses time-of-flight methodology with 12 transmitting antennas and 16 receiving antennas, resulting in 192 virtual elements. When radar signals from these 192 virtual elements are processed, the radar achieves a resolution higher than 1,000 virtual elements. The time-of-flight principle measures the time difference between the signal sent from the radar and the returning signal from objects in the environment. The principle is an established methodology to measure objects' lateral velocity accurately.

Biomimetic Radar™ comprises 4D radar sensors and an integrated AI-based processing platform to assess four parameters: azimuth, height, velocity, and depth. It creates a dense point cloud that generates environmental information on a par with light detection and ranging (LiDAR) technology for Level 4 autonomous vehicles and advances ADAS functionalities in Level 2 autonomous vehicles.

Conventional radar technologies involve lengthy and cumbersome micro-Doppler features to simulate environments, leading to erroneous results and high latency in vehicle decision-making that could result in fatal mistakes. Spartan Radar's solution has AI-based mapping algorithms that use machine learning to apply logic to process radar information in real time with low latency in responses. The radar processes information in two stages. Firstly, it minimizes information and maintains power consumption for the radar transmitter-receiver chipset. Secondly, it categorizes huge volumes of incoming data from the environment into sets so that the vehicle's computer receiving data can make decisions on the road.

The radar's algorithms enable decision-making through continuous analysis of the environment by distinguishing stationary and moving objects. The algorithms perform self-localization where algorithm logic applied to incoming radar signals helps the vehicle determine the object type (object classification), its distance to the object, and whether it should switch lanes. This robust decision-making by Biomimetic Radar™ is responsible for high-level autonomy in Level 4 autonomous vehicles.

Frost & Sullivan commends Spartan Radar for its effective integration of edge intelligence, AI algorithms, and the numerous virtual channels produced by the transmitter and receiver antennas in enabling a biomimicry approach to visual perception.

### ***Commitment to Creativity***

Spartan Radar developed Biomimetic Radar™ based on its core team's shared understanding of automotive industry challenges. Blake Gasca (co-founder) and Robert Brown (chief strategy officer), part of the Spartan Radar leadership team, have experience in the trucking industry, which is beset with technology-related challenges to environmental perception. Backed by their knowledge in the trucking industry and autonomous vehicles, the Spartan Radar team saw a strong opportunity for a 4D biomimetic radar for the autonomous driving industry.

Spartan Radar raised \$25 million in funding from its seed and Series A funding rounds in 2021. The funds accelerated the development of Biomimetic Radar™ from research to testing to deployment, helping the team to meet customer demand.

Competing radar sensors calculate each dimension, such as speed, direction, and range, separately because they sense an object in one location and another in a second location before deducing speed and direction. They take a longer time to enable decision-making in the vehicle. In contrast, integrating

machine learning algorithms in Spartan Radar's Biomimetic Radar™ enables edge inferencing capabilities to measure azimuth, height, depth, and velocity simultaneously and distinguish objects in high resolution. The radar's 4D measurements with biomimicry capabilities result in highly accurate, real-time environmental perception.

### ***Application Diversity***

While Spartan Radar's focus is on enabling Levels 2, and 4 vehicle automation, the company aims to extend its solution to robotaxis, autonomous trucks, and ADAS applications in automated cars. The radar's ability to perceive the environment in real time with human accuracy makes it integral to the sensor fusion architecture of robotaxis and autonomous trucks and vehicles.

Apart from these application areas, Spartan Radar sees immense potential in mining vehicles. The company expects its radar solution to have large-scale application opportunities to ensure the safety and automation of mining vehicles that traverse rough terrains during a mine exploration. Spartan Radar also aims to explore military and defense applications in the future. Its 4D radar solution has the potential to enable naval and air surveillance.

### ***Growth Potential and Customer Acquisition***

Spartan Radar forms solid partnerships with automotive and established mining vehicles original equipment manufacturers in North America to lay the foundation for its growth in the next two years. The company currently focuses on business-to-business customers in North America and plans to establish strategic alliances with automotive participants in Europe. The company capitalizes on its partnerships in the automotive field and participates in traditional marketing activities such as trade shows to create awareness for its solution. For instance, Spartan Radar plans to present its radar technology at the Manifest trade show in January 2022 in Las Vegas.

Spartan Radar collaborates with the Society of Automotive Engineers (SAE), the global standards developing association of engineers in the mobility industry, and other third-party validators to ensure its radar technology meets safety standards and protocols. Quality assurance is critical to strengthening the company's brand and enabling high growth potential for the future.

Frost & Sullivan applauds Spartan Radar for its strategic partnerships, effective marketing strategies, and ongoing third-party validation collaborative efforts and believes Spartan Radar will gain a huge customer base in North America and beyond.

### ***Human Capital***

Spartan Radar is backed by a strong team of engineers, software developers, and visionary leaders with immense knowledge in the automotive industry. The team also has members with backgrounds in defense and aerospace. Nathan Mintz, the company's chief executive officer, has prior experience in Unmanned Aircraft Systems (UAS) and space and airborne radar, while co-founder Blake Gasca has prior experience in trucking, computer vision, and automated vehicles. Dr. Theagenis Abatzoglou, co-founder and Chief Technologist has over 25 patents and 70 publications in advanced radar processing. Finally, Tyler Rather CTO and co-founder was the former Director of Digital RF for Physical Optics Corporation,

Tyler also spent 12 years managing teams and engineering radar solutions for Raytheon. The Spartan Radar team is committed to overcoming automotive industry challenges and taking vehicle autonomy to the next level with its 4D biomimetic radar solution.

Supported by a well-rounded team and clear execution strategies, Spartan Radar's robust Biomimetic Radar™ is set to enhance vehicle autonomy and gain large-scale commercial adoption.

## Conclusion

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Conventional radar solutions have low resolution, low accuracy in object detection and classification, and are unable to measure different object dimensions simultaneously, resulting in slower decision-making in autonomous vehicles. These radar systems calculate each dimension separately and rely on cumbersome simulation algorithms that make it difficult to perceive the environment in real time.

Spartan Radar's Biomimetic Radar™ aims to mimic human perception in environmental perception. The radar works at high speed by integrating 12 transmitting antennas, 16 receiving antennas, machine learning algorithms. The radar's 192 virtual elements can generate a resolution higher than 1,000 virtual elements post-processing with AI. The radar can perform real-time environmental perception, object classification, and vehicle localization to enable effective decision-making in autonomous vehicles.

With its strong overall performance, Spartan Radar earns Frost & Sullivan's 2022 North American Technology Innovation Leadership Award in the 4D radar for automotive industry.

## What You Need to Know about the Technology Innovation Leadership Recognition

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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

