APERA

2025 TECHNOLOGY INNOVATION LEADER

Enhancing Customer Impact Through Powerful Technology Integration

RECOGNIZED FOR BEST PRACTICES IN THE GLOBAL ROBOTIC AUTOMATION SOFTWARE INDUSTRY

FROST & SULLIVAN

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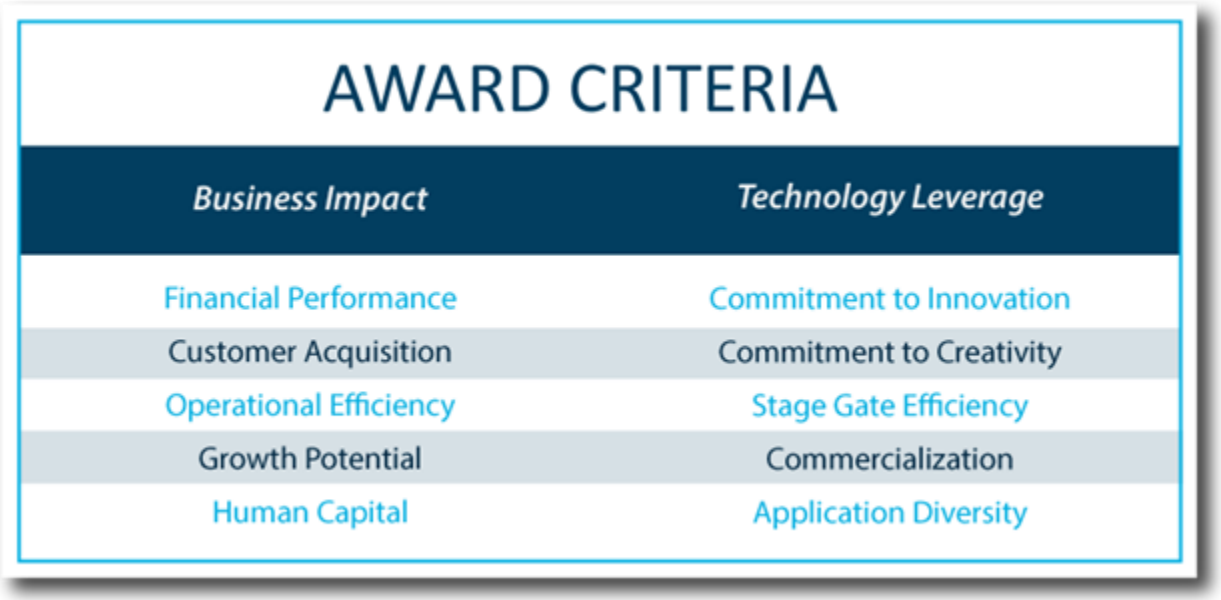
Best Practices Criteria for World-class Performance

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. Apera AI excels in many of the criteria in the robotic automation software space.



Apera AI: Transforming the Future of Industrial Manufacturing

Due to labor shortages, rising costs, safety concerns, and increasing demands for efficiency, productivity, and accuracy, manufacturers are turning to automation. From material handling robots to automated inspection systems, companies invest significantly in advanced automation to uphold quality standards, minimize human error, and optimize operational efficiency. While industrial robots have long been leveraged in heavy manufacturing, collaborative robots (cobots) are today becoming more prevalent as new tools to support and work alongside human workers with tasks such as heavy lifting, repetitive motions, and assembly work. Cobots' ability to operate safely alongside human workers without requiring extensive restrictions is a game-changing advantage for manufacturers. As the talent shortage increases, cobots become a strategic necessity, not only for maintaining continuity and a competitive edge but also for enabling flexible automation in factories.

As the manufacturing industry faces increasingly complex and customized demands, the need for advanced robotics solutions is growing. Artificial intelligence (AI)-powered advancements in computer vision are unlocking new levels of precision and capability in robotics that could meet these challenges. However, computer vision implementation comes with significant barriers, including the need for specialized expertise, lengthy and costly development cycles, and concerns about solution reliability due to a lack of proven performance benchmarks. Solution providers that can overcome these challenges will be well-positioned to capitalize on the expanding robotics market.

Founded in 2016 and headquartered in Vancouver, British Columbia, Apera AI specializes in advanced four-dimensional (4D) vision technology for robotic automation. The company's pioneering AI-driven 4D vision software enables industrial robots to reach their fullest potential, delivering unmatched precision, efficiency, and adaptability. 4D vision combines high quality 3D stereo cameras with a unique AI-driven training process, generating millions of digital parts in the cloud to train Apera AI's neural networks for real-world part finding and robotic guidance. This approach optimizes manufacturing processes, enhances quality control, and empowers factories to achieve higher productivity. Apera AI's vision technology is a powerful enabler of intelligent robotics, unlocking unprecedented capabilities across diverse industries. Operating in a rapidly evolving market, Apera AI is leading the automation transformation in factories, paving the way for an intelligent, more efficient future in manufacturing.

Building Trust with Unmatched Capabilities

Apera AI enhances existing robotic systems with advanced capabilities, delivering immediate value to manufacturers through optimized productivity and cost-effectiveness. Its software's compatibility with existing hardware enables seamless integration with long-established industrial robots trusted by manufacturers for decades. By eliminating the need for new equipment, Apera AI offers manufacturers significant cost savings while providing access to the latest advancements in vision-guided robotics. Its 4D vision technology enables advanced object recognition and spatial awareness, empowering robots to perform intricate tasks with greater precision and reliability. For example, a previously vision-free automotive cell equipped with Apera AI's vision technology demonstrated significantly improved part detection, alignment, and quality improvement. These enhancements reduced errors, minimized downtime, and accelerated production, leading to higher throughput and consistently improved quality across manufacturing processes.

Apera AI allows manufacturers to drastically reduce micro stops by significantly minimizing incidents like misalignments and sensor errors. Its Apera Vue software empowers robots to recognize parts in all possible orientations, ensuring a comprehensive understanding of each component, effectively preventing interruptions, and empowering robots to operate at full industrial speed. This approach leads to a more reliable and efficient production line. The company has a proven track record of empowering robots with underperforming vision technology, unlocking their full potential. For example, Apera AI assisted a major automotive original equipment manufacturer experiencing a 50% failure rate in a robotic cell due to its vision system's inability to identify the pick-up point for its transmission casings accurately. The part was difficult to detect because the casings were haphazardly positioned on a cart, preventing the system from properly locating and picking them up.

By training its AI to understand the transmission casing completely in three dimensions, the company resolved the issue, enabling the robot to precisely locate the pick-up points, even when not visible to cameras, and grasping the casings with 99.9% reliability.[1] With human-like comprehension, the robot can even recognize the orientation in which the transmission was picked up, enabling it to position them with precise accuracy, down to the millimeter, for the next manufacturing step. Besides applications for industrial robots in the automotive sector (e.g., bin picking, assembly, and machine tending), Apera AI's

[1] Frost & Sullivan Interview with Apera AI, July 2025

solutions also support cobots, which are designed to work safely and seamlessly alongside human workers without the need for safety fences. This technology enables more flexible and adaptable automation, especially in dynamic and evolving shopfloor environments where human and robotic tasks often overlap and require real-time cooperation.

"Frost & Sullivan lauds Apera AI for tackling key industry challenges, like micro stops and external triggers, such as lighting and vibrations, that cause delays and impact robot reliability. Its ability to handle intricate and challenging objects effectively underscores the company's leadership in advanced vision-guided robotics solutions.

-Karthik Sundaram
Research Director

Apera AI's unmatched vision capabilities extend beyond comprehensive part finding with detailed robotic cell simulation including real physics like collision and gravity to validate cell and tooling designs before building, avoiding costly rework. Apera AI also empowers robots to operate optimally across a wide range of lighting conditions (a common source of unreliability in machine vision, particularly with traditional structured light systems), performing effectively in dim or bright light without specific lighting requirements. By obtaining comprehensive training on various lighting conditions, shadow casting, and light interactions with objects, Apera AI's systems maintain peak performance in any environment, ensuring unwavering reliability and consistent results.

With Apera AI's advanced, real-time vision capabilities, robots excel in handling highly reflective or transparent objects, which many vision systems struggle with due to glare, distortion, and light refraction. The company's software manages everything from mirror-finish and chrome-plated products to fully transparent items like glass tubes, empowering applications beyond the automotive industry into sectors such as consumer packaged goods and life sciences. Moreover, its vision technology systems outperform existing three-dimensional (3D) vision solutions on the market, achieving vision cycle times as fast as 300 milliseconds, or just 0.3 seconds.[2]

Apera AI has a unique approach to vision-guided robotics. Traditional 3D vision systems for robotic automation rely on structured light or laser-based depth sensing, which project a known pattern onto a scene and measure how it deforms to calculate depth. While these methods can deliver reasonable accuracy in controlled environments, they struggle in real-world factory settings (particularly with shiny, black, transparent, or overlapping parts) due to sensitivity to ambient light, occlusions, and motion blur. In contrast, Apera AI uses a high-resolution stereo vision system, triangulating two synchronized images for 3D perception without any light projection. This method enables faster image acquisition, immunity to lighting inference, and greater reliability on challenging surfaces. Apera AI's factory-calibrated stereo cameras use advanced AI within its 4D vision technology for detailed point clouds and accurate part positioning, delivering unparalleled precision. With no need to stop motion or synchronize with projector pulses, Apera AI's system enables high-speed, robot-mounted operation, unlocking faster cycle times and greater flexibility on the factory floor.

[2] https://apera.ai/products/apera-vue-robotic-vision-software/

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Roadmap to Success: Simulate, Train, Deploy

> *"Frost & Sullivan commends Apera AI for helping customers minimize risks, time, and cost of developing and deploying robotic systems. Its new Forge Lab software delivers exceptional value by streamlining workflows, ensuring solution viability, and accelerating return on investment.*
>
> ***-Rubini Kamal***
> ***Best Practices Research Analyst***

Apera AI simplifies advanced vision technology integration, allowing manufacturers to deploy it seamlessly without specialized machine or computer vision expertise. In 2024, the company introduced Apera Forge, its AI-powered robotic vision training portal and simulation platform designed to reduce the significant costs of developing and implementing new automation solutions. Customers can provide a 3D model file of the object for picking or placement, specify relevant parameters (e.g., pick from a small bin or large tray), and initiate AI training.

Apera Forge trains an AI neural network using synthetic data through a million cycles to achieve >99.9% reliability in recognizing objects and performing tasks. Factors such as part geometry, finish, and appearance under different lighting are all trained into the program, until greater than 99.9% reliability occurs in the simulation. The fully automated process accelerates deployment, with AI training returning a complete vision program ready for the plant floor, enabling customers to quickly leverage Apera AI's advanced vision technology to enhance productivity and drive profitability. Moreover, through its simplified implementation, Apera AI empowers manufacturers to optimize operations without hiring computer vision experts, resulting in substantial cost savings.

Forge is also a powerful simulation tool for validating robotic cell design. Recognizing that 70% of automation implementation costs go to the development cycle, Apera AI optimized the process to accelerate vision-guided robotics deployment, enhancing efficiency and reducing costs. Apera AI recognized that no existing simulation and training platform catered to vision-guided robotics to lower the risks and time involved in developing robotic cells. Without a comprehensive simulation environment, manufacturers could not conduct extensive tests and identify potential issues in a virtual environment before deploying them in real-world settings. This gap prevented building customer confidence in the robot's ability to avoid collisions, navigate its path, and accurately pick items. With Apera Forge, manufacturers can build and simulate robotic cells without physical hardware, eliminating the substantial costs of building physical robotic cells to test them, projects that usually take months to build, program, test, and deploy. The web-based simulation platform allows manufacturers to design and optimize new automation systems from scratch. After finalizing the robotic cell and ensuring consistent performance, the cell can be sent for training, with a vision program ready to be downloaded and deployed in the real world within 24 to 48 hours.

Apera AI reports that Forge has quickly become a major asset for automation and robotics engineers, especially in demonstrating solution viability to management, thus boosting their confidence. They also value the platform's capability to quickly train an AI model and convert it into a vision program, which can

then be seamlessly downloaded and deployed into Apera Vue for real-cell testing. This entire process can be completed within a few days, allowing them to iterate on new concepts quickly while maintaining high reliability. Launched at Automate 2024 in Chicago, United States, Apera Forge has already been adopted by over 200 customers, demonstrating strong demand and significant market opportunity.

Frost & Sullivan commends Apera AI for helping customers minimize the risks, time, and cost of developing and deploying robotic systems. Its new Forge software delivers exceptional value by streamlining workflows, ensuring solution viability, and accelerating return on investment.

Customer-centric, Continuous, Proactive

Apera AI delivers exceptional customer support, ensuring clients achieve their automation objectives and realize positive business outcomes. Its customer success team partners with clients throughout their journey, offering resources and expertise to facilitate seamless deployments and ensure return on investment (ROI). Through onsite visits, the team assists clients with initial installations, empowering them to become self-sufficient and proficient in using Apera AI's vision-guided robotics solution. The customer success team maintains an integral role throughout the customer journey, maintaining a strong operational relationship to support long-term success. In addition, Apera AI provides 24/7 customer service to address inquiries and resolve troubleshooting needs, promoting seamless operations and minimizing downtime. The company also offers comprehensive online resources, enabling clients to access detailed information on its software and user guides. Notably, its software has built-in resources and support tools designed to help customers troubleshoot and expedite issue resolution.

With its best-in-class solutions and strong customer focus, Apera AI continuously garners overwhelming positive feedback. Customers appreciate the company for helping them bypass the complexities of vision programming to leverage advanced vision technology and enhance precision, reliability, productivity, and employee safety. The time-saving advantages are another key strength valued by customers, enabling faster and more reliable vision implementation, which accelerates ROI. The company reports achieving ROI within six to 18 months for new solutions and as quickly as 60 days for existing robotic systems. With its unmatched capabilities, Apera AI has secured several customer wins in 2024, now boasting a robust customer base in North America, reportedly in the hundreds, including more than 10 leading automotive manufacturers and Tier 1 suppliers. Through the extension of its North American customers, Apera AI is also expanding into other geographies, including Europe and Asia.

Robot-agnostic and compatible with all major robot brands, Apera AI is experiencing significant growth in key markets such as automotive, electronics, and logistics. Approximately 50% of its sales come from enhancing the performance of existing robotic installations, including those not yet equipped with vision technology and those using vision systems that underperform. Apera AI reports compounded annual growth in the triple-digit percentage range.[3] With the robotics market expected to expand by 8% to 17%, excluding retrofits of existing robots, the company anticipates a substantial addressable market and significant growth over the next five to seven years.[4]

[3] Frost & Sullivan Interview with Apera AI, July 2025

[4] Ibid.

Frost & Sullivan notes Apera AI's impressive growth momentum and trajectory and believes the company is well-positioned to drive the robotic automation software space into its next growth phase and sustain its innovative edge in the coming years.

Conclusion

Delivering best-in-class technology is crucial for providing customer value and sustaining market leadership. With its advanced 4D vision technology, Apera AI helps manufacturers optimize their existing robotic system, enabling greater precision, reliability, productivity, and employee safety while saving substantial costs. Its solution suite (i.e., Apera Vue and Apera Forge) eliminates the complexities of traditional vision programming, empowering manufacturers to harness advanced vision technology, expedite solution implementation, and accelerate return on investment. The company's exceptional customer support ensures smooth deployments and successful outcomes, fostering long-term customer satisfaction. Apera AI's innovation-driven, customer-focused approach delivers significant value to existing and new customers, reinforcing its reputation in the market as the leader in 4D vision-guided robotic automation solutions.

With its strong overall performance, Apera AI earns Frost & Sullivan's 2025 Global Technology Innovation Leadership Award in the robotic automation software industry.

What You Need to Know about the Technology Innovation Leadership Award?

Frost & Sullivan's Technology Innovation Leadership Award is its top honor and recognizes the market participant that exemplifies visionary innovation, market-leading performance, and unmatched customer care.

Best Practices Awards 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: 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 business performance is achieved in terms of revenue, 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: Leveraging innovative technology characterizes the company culture, which enhances employee morale and retention

Best Practices Award Analytics Methodology

Inspire the World to Support True Leaders

This long-term process spans 12 months, beginning with the prioritization of the sector. It involves a rigorous approach that includes comprehensive scanning and analytics to identify key best practice trends. A dedicated team of analysts, advisors, coaches, and experts collaborates closely, ensuring thorough review and input. The goal is to maximize the company's long-term value by leveraging unique perspectives to support each Best Practice Award and identify meaningful transformation and impact.

		VALUE IMPACT	
STEP		WHAT	WHY
1	**Opportunity Universe**	Identify Sectors with the Greatest Impact on the Global Economy	Value to Economic Development
2	**Transformational Model**	Analyze Strategic Imperatives That Drive Transformation	Understand and Create a Winning Strategy
3	**Ecosystem**	Map Critical Value Chains	Comprehensive Community that Shapes the Sector
4	**Growth Generator**	Data Foundation That Provides Decision Support System	Spark Opportunities and Accelerate Decision-making
5	**Growth Opportunities**	Identify Opportunities Generated by Companies	Drive the Transformation of the Industry
6	**Frost Radar**	Benchmark Companies on Future Growth Potential	Identify Most Powerful Companies to Action
7	**Best Practices**	Identify Companies Achieving Best Practices in All Critical Perspectives	Inspire the World
8	**Companies to Action**	Tell Your Story to the World (BICEP*)	Ecosystem Community Supporting Future Success

*Board of Directors, Investors, Customers, Employees, Partners

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The Growth Pipeline Generator™

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

Learn more.

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:

- Megatrend (MT)
- Business Model (BM)
- Technology (TE)
- Industries (IN)
- Customer (CU)
- Geographies (GE)