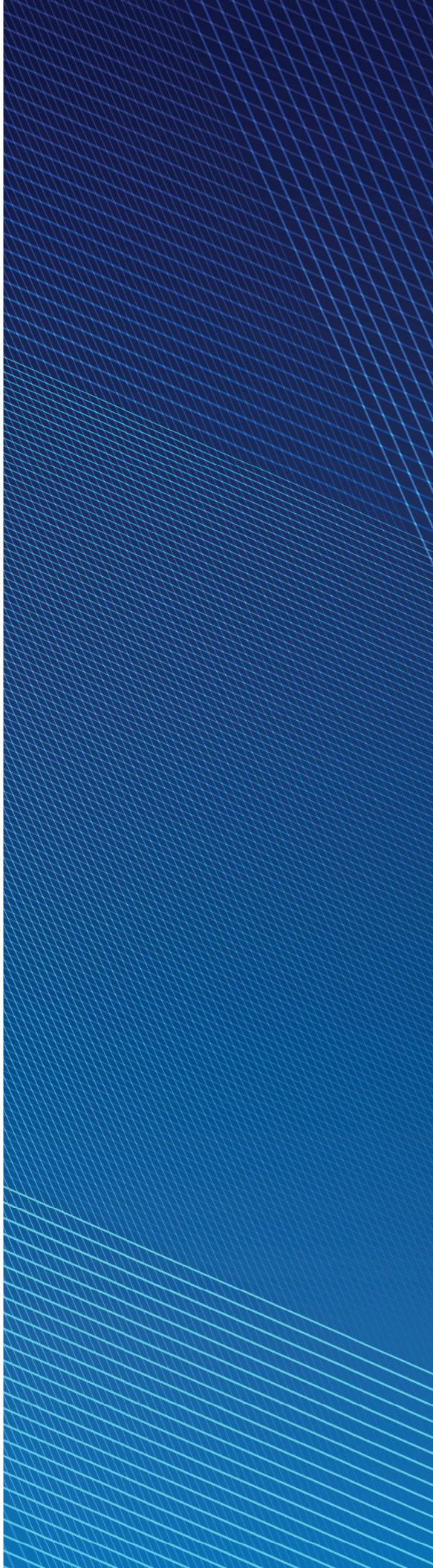
FROST & SULLIVAN

RECOGNI RECEIVES THE 2023 TECHNOLOGY INNOVATION LEADERSHIP AWARD

Identified as best in class in the global autonomous vehicle system-on-chip 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. Recogni excels in many of the criteria in the autonomous vehicle system-on-chip space.

Recogni Scorpio: First Technology of Its Kind in the Autonomous Mobility Sector

Autonomous mobility is a game-changing breakthrough in transportation. It involves creating and using self-driving vehicles that can travel on roads without needing humans to control them. At the intersection of cutting-edge technology, urban planning, and regulatory frameworks, autonomous mobility aims to revolutionize how people and goods move within society. At its core, pursuing autonomous mobility revolves around addressing critical challenges. This transformative concept promises safer roads, enhanced accessibility, reduced traffic congestion, improved environmental sustainability, and a reimagined passenger experience.

Ensuring safety is paramount, requiring vehicles equipped with advanced sensors and artificial intelligence (AI) systems that can process vast amounts of real-time data to navigate complex urban environments and unpredictable scenarios. For widespread adoption, autonomous vehicles must operate safely and integrate seamlessly with traditional vehicles, public transportation systems, and existing road infrastructure.

Reducing energy consumption and pollution is another pivotal aspect of autonomous mobility. As the world grapples with environmental concerns, self-driving vehicles must strive for energy efficiency and employ cleaner propulsion technologies to minimize their ecological footprint. By optimizing routes and reducing congestion, autonomous mobility has the potential to alleviate traffic-related stress while improving overall productivity.

The autonomous mobility landscape extends beyond individual vehicles. It envisions an ecosystem of interconnected vehicles, infrastructure, and data-sharing systems, all working harmoniously to create a safer, more efficient, and sustainable transportation network. However, realizing this vision requires technological advancement, thoughtful urban planning, and infrastructure updates.

Recogni is a pioneer in vision-oriented AI systems. The company maintains a robust presence with offices in San Jose, California, and Munich, strategically positioned to foster innovation and collaboration on a global scale. With a focus on enabling vehicles to perceive, decide, and act in ways that surpass human capabilities while prioritizing energy efficiency, the company stands as a vanguard in pursuing safer, more efficient, and sustainable transportation systems. This approach has proven instrumental in achieving exceptional object detection and classification accuracy levels. Its Scorpio Al Processor (Scorpio) solution is crucial in empowering autonomous driving (AD) systems to make highly informed and precise driving decisions.

Driving Continual Technology Leadership Enhancements

The essence of automated driving hinges on the synergy of multiple high-resolution cameras and high-performance AI processing. However, current solutions must meet the stringent power and system cost targets original equipment manufacturers (OEM) set. Acknowledging this disparity, Recogni steps in with its groundbreaking innovation, Scorpio. Crafted to cater to advanced driver-assistance systems (ADAS) and AD, Scorpio charts new frontiers in performance benchmarks. The solution redefines the landscape of vision-based automotive technologies by amalgamating unparalleled processing prowess with diligent energy management.

> *"With the automotive industry increasing focus on vision-based safety systems, combined with OEMs' push for new electrical or electronic architecture that uses state-of-the-art computing, Recogni is poised to make a big impact in this market with its innovative and technologically advanced product."*
>
> ***- Kamalesh Mohanarangam***
> ***Connected and Autonomous Vehicles Research Manager***

The Scorpio vision-inference chip, accuracy goes beyond what humans can do, covering a wide range of up to 300 meters (m) in real-time. This applies to various road and environmental situations. Furthermore, this innovative chip boasts the exceptional capacity to handle multiple streams of ultra-high resolution and high frame rate camera feeds. Recogni's solution is currently undergoing evaluation by prominent automotive manufacturers and suppliers.

With a prowess that achieves an impressive 1,000 tera operations per second (TOPS), accompanied by a processing latency of less than ten milliseconds and power consumption beneath the 25-watt (W) threshold, Scorpio emerges as a pinnacle of computational efficiency.

Scorpio subsystems integrate within the primary vehicle's electronic control unit (ECU) module. It is a tangible testament to Recogni's unwavering commitment to customized solutions for the transformative autonomous mobility landscape. Remarkably, it allows the ECU ample time to execute essential driving decisions seamlessly. Furthermore, boasting high computing capabilities ranging from 150 to 1,000 TOPS, Scorpio exhibits remarkable power efficiency performance of up to 40 TOPS/W. This accomplishment

represents a performance superiority of substantial magnitude over any other offering present in the current market landscape.

Scorpio's power lies in its ability to enable higher resolutions, a feat that has a transformative impact on perception capabilities. Recogni leverages this advantage to achieve unprecedented milestones, such as long-range three-dimensional perception. By harnessing Scorpio's full potential Recogni realizes an impressive eight-megapixel detection capability that spans over 300 m, which is better than other solutions presently available on the market.

Recognized as the industry's pioneering inference solution for autonomous mobility in the 1,000 TOPS class (surpassing the required 600 TOPS), Scorpio is a fully functional chip that was developed in an impressive 15-month timeframe. Notably, the company reached a significant achievement by delivering its initial customer systems by early 2022. This accomplishment strongly highlights the effectiveness and flexibility of its methodology, showcasing its systems' superior energy efficiency, outperforming competing solutions (10 to 20 times more power efficient).

Recogni's machine learning models possess a remarkable capability that extends beyond mere object identification within videos. These models have been designed to not only discern and classify objects but also to accurately ascertain both their precise positions and distances within the visual scene.

By leveraging advanced algorithms and techniques, Recogni's models can analyze complex visual data from various sources. This intricate analysis enables users to not only recognize objects but also generate essential spatial information. This includes pinpointing the location of detected objects within the frame and calculating their relative distances from the camera's viewpoint.

Poised to revolutionize the landscape for OEMs and suppliers, Recogni aims to integrate new, dynamic ADAS and self-driving capabilities into their vehicles. The company's groundbreaking approach resonates beyond perception; it extends the range and viability of electric vehicles (EV), paving the way for a more sustainable, safe, and efficient future. With the automotive industry increasing focus on vision-based safety systems, combined with OEMs' push for new electrical or electronic architecture that uses state-of-the-art computing, Recogni is poised to make a big impact in this market with its innovative and technologically advanced product.

Creating Competitive Differentiation that Meets Industry Needs

Through the seamless integration of Scorpio's capabilities, Recogni establishes itself as a pivotal contributor to enhancing the efficiency and practicality of EVs. The ability to significantly increase the driving range directly addresses one of the primary concerns of EV range anxiety. Recogni's technological excellence instills heightened confidence and assurance among EV users, who can travel farther on a single charge. This accomplishment holds the potential to transform the way people perceive and utilize EVs.

Recogni's adoption of the Log Number System (LNS) and its unique compression technique signifies a groundbreaking departure from conventional methods. This innovation elevates computational accuracy to remarkable heights, aligning seamlessly with the well-established 32-bit floating-point precision (FP32) standard. Recogni's ingenuity shines through in its strategic utilization of high computing power and FP32

accuracy. Yet, what distinguishes Recogni is its inventive and efficient approach, leveraging both the LNS and a patented compression methodology. This ingenious combination yields accuracy comparable to the industry standard FP32 while substantially reducing compute power requirements.

Recogni's innovative approach challenges the norm and sets a new standard for efficiency in AI inference processing. By combining accurate computing with efficient power usage, Recogni paves the way for improved accuracy while redefining the relationship between computing power and performance. Through these novel strategies, Recogni demonstrates its commitment to pushing innovation boundaries and making a real impact across industries and applications.

Recogni excels in innovation, particularly when it comes to processing high-resolution data. The company ensures the fastest possible data processing at the intersection of efficiency and responsiveness. This attribute fundamentally transforms how users perceive things, enabling real-time insights critical to autonomous systems' functionality. Recogni's strength also lies in its ability to simultaneously process the entire pipeline, seamlessly managing the journey from sensor input to machine learning output. A key aspect of Recogni's approach is that it does not require external memory buffering, which keeps the data flow smooth and consistent. Most importantly, Recogni achieves 100% success and reliable execution, showcasing the company's dedication to accuracy and dependability.

"Recognized as the industry's pioneering inference solution for autonomous mobility in the 1,000 TOPS class (surpassing the required 600 TOPS), Scorpio is a fully functional chip that was developed in an impressive 15-month timeframe. Notably, the company reached a significant achievement by delivering its initial customer systems by early 2022. This accomplishment strongly highlights the effectiveness and flexibility of its methodology, showcasing its systems' superior energy efficiency, outperforming competing solutions (10 to 20 times more power efficient)."

- Norazah Bachok
Best Practices Research Analyst

Recogni leverages cutting-edge processing nodes to power its advanced AI capabilities. The AI capabilities are intended to enable autonomous vehicles to make sense of data from various sensors such as high-resolution cameras through Scorpio, as well as radars, light detection and ranging (LiDAR), and other sensors via central CPU. Managing of the heavy workload of imaging relieves the ECU to manage sensor fusion functions by integrating data from multiple sensors to create a comprehensive and accurate representation of the vehicle's surroundings. This is a crucial aspect of autonomous driving, as it helps the vehicle understand its environment and make real-time informed decisions.

The company's use of 7nm process by TSMC, a global semiconductor manufacturing leader, underscores Recogni's commitment to pushing the boundaries of technology. By harnessing state-of-the-art processing nodes, Recogni's systems can efficiently process the massive amounts of data generated by sensors like high-resolution cameras. These processing nodes enable Recogni's machine learning models to perform complex tasks such as real-time object detection, localization, and distance estimation. This results in highly accurate perception and decision-making for autonomous vehicles, enhancing their safety and reliability.

Moreover, Recogni's technology is designed to process and fuse the data from these diverse sensors efficiently, allowing autonomous vehicles to perceive their surroundings accurately and respond appropriately to various driving scenarios. By combining data from different sensors, the system can

compensate for the limitations of individual sensors and provide a more reliable and robust perception of the environment.

Recogni's innovation goes beyond just ideas. It reaches into the realm of silicon engineering. This commitment to excellence is showcased through its approach of creating “small silicon.” A truly remarkable achievement by the company is the reduction in silicon size by a factor of four, all while achieving an astonishing seven-fold increase in performance. This transformative leap, combined with an unparalleled thirteen-fold improvement in power efficiency, reshapes the landscape of silicon technology. Recogni's small silicon philosophy is not merely about size reduction; it is about propelling performance and energy efficiency to unprecedented heights, expanding silicon's boundaries.

Frost & Sullivan's analysis indicates that Recogni's approach facilitates smooth data flow and finely tuned computational processes, resulting in streamlined and responsive operations. The company achieves outstanding enhancements in performance and energy efficiency while also reducing the size of its silicon footprint. This not only transforms the field of silicon engineering but also paves the way for a future focused on improved efficiency and sustainability in the world of autonomous mobility.

Remarkable Branding Image

Recognized for its unparalleled capability to achieve perception with low latency and master diverse road and environmental conditions, Recogni continuously gained significant recognition for its excellent solution. For example, the Microprocessor Report acknowledged Scorpio for outperforming other inference engines housed within leading system-on-chip products available on the market. This accolade underscores that Scorpio is not just a breakthrough; it sets new benchmarks by surpassing existing standards.

Furthermore, what sets Recogni's offering apart is the open architecture of the platform, driving function software and allowing partners and clients the flexibility to execute their own perception. Central to this lineup is the Phoenix system, first automotive development platform meticulously crafted as a development platform for autonomous vehicle ECU design.. Recogni also developed the Pegasus PCIe card targeted for AI perception that can operate with ARM and X86 systems. Both Phoenix and Pegasus excels in delivering unparalleled performance through advanced AI convolutional neural networks, all the while maintaining minimal latency. Impressively, it accommodates cutting-edge vision Transformer Networks, showcasing Recogni's commitment to staying at the forefront of technology.

Scorpio exemplifies innovation, not solely for its impressive technological advancements but also for its potential to reduce system costs significantly. It is possible through Scorpio's purpose-built architecture, boasting industry-leading power efficiency. This efficiency translates into a transformative impact on the overall system cost, positioning Recogni as a trailblazer in developing solutions that are both cutting-edge and economically viable.

Despite its product’s advanced functionality, the company maintains a minimal energy footprint, matching its commitment to sustainable and efficient solutions. By notably diminishing the energy required for each processing unit, Recogni empowers its solutions to be both technologically advanced and economically efficient, which represents a combination that resonates deeply in today's landscape of autonomous mobility.

Conclusion

Positioned at the forefront of reshaping the mobility landscape, Recogni's visionary approach focuses on delivering unparalleled inference performance through cutting-edge edge processing technology. The company's brilliance in autonomous mobility shines through the revolutionary Scorpio artificial intelligence processor. This innovative solution boasts a remarkably high compute capacity, from 150 to 1,000 tera operations per second (TOPS), and exceptional power efficiency of up to 40 TOPS per watt. Scorpio showcases minimal latency, with processing delays under ten milliseconds, all within a compact silicon design.

With an unparalleled reputation for power efficiency, superior perception capabilities, and unprecedented processing speed, Recogni stands as a vanguard ready to redefine the course of autonomous driving. This vision promises a future where safe, efficient, and sustainable mobility transforms from a distant aspiration to an imminent and tangible reality.

For its strong overall performance, Recogni is recognized with Frost & Sullivan's 2023 Global Technology Innovation Leadership Award in the autonomous vehicle system-on-chip 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™

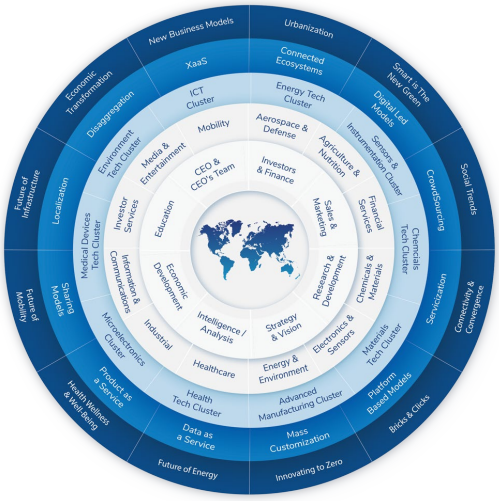
Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.
Learn more.

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:

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