FROST & SULLIVAN

OTTOPIA

2022 MARKET LEADER

GLOBAL TELEOPERATIONS FOR THE AUTONOMOUS DRIVING 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. Ottopia excels in many of the criteria in the teleoperations for autonomous driving space.

Humans and Autonomous Vehicle Evolution

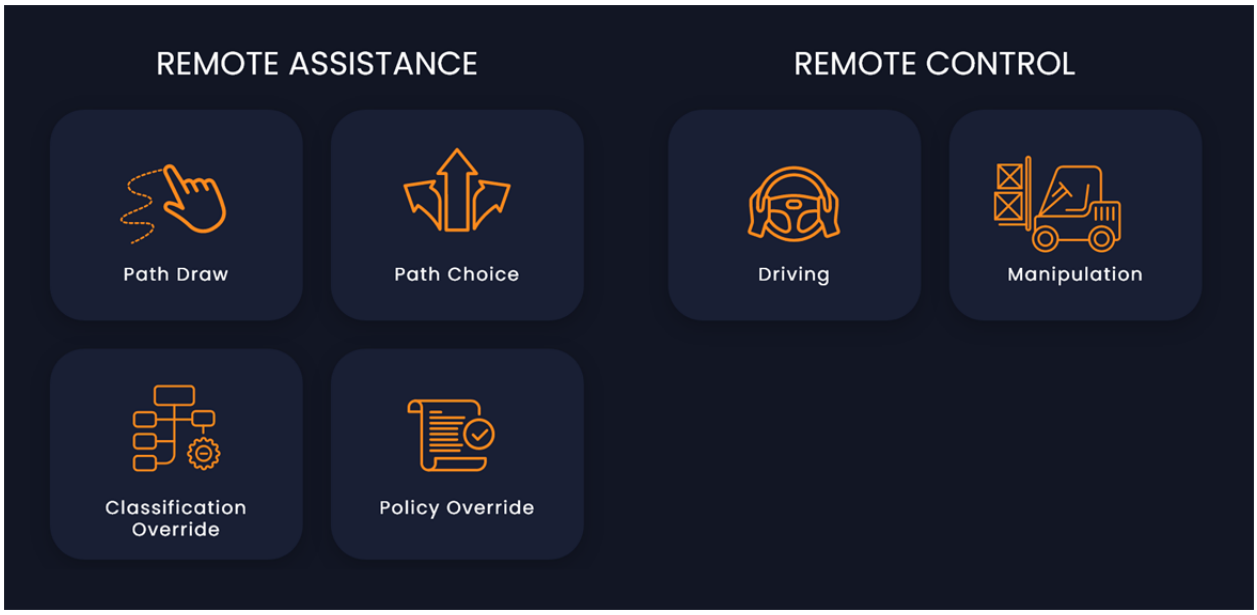
Autonomous vehicles (AVs) accelerate, brake, and turn independently, requiring little or no input from a human driver. However, the actual operation of AVs is intrinsically different from human-driven vehicles. For example, the manufacturers can program these vehicles not to break traffic laws. Their reaction times are quicker than humans and can optimize to create smoother traffic flow, improve fuel economy, and reduce emissions. They can also deliver freight and transport travelers who do not drive to their destinations. While autonomous technology has learned to handle many driving situations, designing systems that perform safely in nearly every edge case is challenging. For example, recognition of humans in the roadway and object materials is both critical and more complex for AVs than human drivers. A person in a roadway may be as large as a full-grown adult or as small as a child, in different positions, moving in different directions, or partly obscured, complicating sensor perception. AVs, even those at Level 4, can experience edge circumstances where they can get stuck and are unable to proceed without assistance. It is a complicated situation for AVs, and evasive decisions will depend on whether an object in the vehicle's path is a large piece of a cardboard box or a significant solid impediment. AV will require a multifaceted approach to attend to these unique edge cases effectively.

Humans in the Loop

Founded in 2018 and headquartered in Tel Aviv, Israel, Ottopia is a software company that enables the commercial deployment of AVs via its proprietary teleoperations application. Ottopia's founding team combined its background in cybersecurity, video compression, and telecommunications to create its platform. The company is at the forefront of providing teleoperations by offering a best-in-class solution that enables the commercialization of AVs. Teleoperations brings a remotely located human in the loop of an AV operating on the roads to provide support in managing a complex driving situation and safely deciding to run with nearly zero latency. The company outpaces its competitors in the teleoperations for the autonomous driving market in multiple verticals. Ottopia offers the only mass-deployed remote assistance system, effectively allowing remote assistance provided to the AV in circumstances at the "edge" when the AV is unable to proceed or experiences difficulty that requires intervention. Ottopia creates a specialized software bridge between an autonomous vehicle with no driver and a remote operator who can provide remote assistance and, if necessary, can even remotely drive the vehicle at a reduced speed. Ottopia's solution applies to any type of autonomous vehicle or machine, such as forklifts, trucks, yard trucks, construction equipment, delivery robots, etc.

> *"The company is at the forefront of providing teleoperations by offering a best-in-class solution that enables the commercialization of AVs."*
>
> ***-John Sisemore,***
> ***Best Practices Research Analyst***

Ottopia can provide remote assistance or can even drive remotely at a reduced speed



Source: Ottopia

Continuous Product Quality Focus

Ottopia is the global leader in the remote vehicle assistance space and has principal customers, like Motional, that operates one of the most established robotaxi fleets with thousands of vehicles. To support the company's AV group operation, Motional selected Ottopia and will use its technology to perform remote vehicle assistance (RVA) when operating its driverless SAE Level 4 AVs. In addition, the company serves original equipment manufacturers in multiple industries with teleoperations solutions. Ottopia's technology reduces costs for AVs operating in logistics centers and ports, maximizing efficiencies. In addition, a key benefit and cost savings is gleaned by improving safety in hazardous environments, such as mines and construction sites. Using Ottopia's technology, remote human assistants can deal with edge issues that autonomy alone cannot. For AV providers to deploy robot fleets, it is vital that they ensure a human is in the loop. It is a complex process from beginning to end and a separate technology from the autonomy itself; this is why industry leaders rely on Ottopia for this essential role.

Human Ottopia assistant providing remote support to an AV

Source: Ottopia

Assured Product Performance

Ottopia offers proficient teleoperations that requires many coordinating technologies and systems to implement safely. Utilizing cameras and encoders, modems, and control stations, the video feed is transmitted over public 4G LTE networks to monitor, assist, and drive any type of AV remotely if needed. Ottopia's customers have AVs that utilize public 4G wireless networks to teleoperate on public streets, enabling human staff to remotely monitor and provide assistance with a real-time video display from the AV. The company, at its fundamental foundation, recognizes that its accomplishments in this space result from its conviction that human interaction is vital. This is because of the many cases where an autonomous system is unable to provide the complete and comprehensive service levels that a customer desires. There can be system downtime due to the absence of a human driver, which occurs because there may be system confusion caused by differing conditions the AV may encounter and cannot supply even simple services to the passenger. Machines in this day and age are truly remarkable and can do amazing things; however, they cannot interact with humans in the same way humans interact with each other, which is a concern associated with autonomy. Even if the AV independence is 100% in terms of its ability to navigate and drive, you still cannot tell an autonomous vehicle to "go park by that pile of dirt next to the tree over there" in a construction zone. The remedy proffered by Ottopia keeps a remote human in the loop. Every problem cannot be resolved by autonomy alone and needs a human being who can manage and resolve difficulties most effectively and safely; thus, teleoperations is an ideal solution.

> *"Through established contracts to provide the service to Motional and companies currently in negotiations, Frost & Sullivan believes teleoperation ability will be necessary for most AV providers in the industry. Generally, they will have few options available to address this need."*
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> ***Best Practices Research Analyst***

Remote support provided by Ottopia to an AV

Quality Strengthens Market Leadership Status

Through established contracts to provide service to Motional and companies currently in negotiations, Frost & Sullivan believes teleoperations ability will be necessary for most AV providers in the industry. Generally, they will have few options available to address this need. They can develop internal infrastructure and systems to address the teleoperations need, which will take substantial focus off of perfecting AVs. They can also enlist the expertise of a recognized teleoperations provider, such as Ottopia, and have that need addressed. As evidence, the BMW Group evaluated and selected Ottopia's teleoperations platform as a preferred multi-SIM teleoperations technology to support autonomous driving services. Ottopia optimized its safe and secure remote teleoperations software with its partner NVIDIA. To address market demands Ottopia has also partnered with Deutsche Telekom to commercialize the technologies that enable teleoperation success. Ottopia's teleoperations technology uses artificial intelligence (AI) to calculate the availability of cellular networks. The high-speed function of AI can facilitate the essential ultra-low latency data transmission necessary to stream a 360-degree video from a moving vehicle to a control center. Ottopia has stated that AVs need to combine with an efficient transit service, where partner, on-demand shuttle, and transit software company Via comes in. Uniting Ottopia’s teleoperations platform and Via’s fleet management software enables Via to offer fleets of autonomous vehicles. The company continues to gain partners and customers as it works to affect the kind of AVs needed for the industry to progress.

Conclusion

As preparation for more deployments of AVs continues over the next few years, one of the many pieces of the complex puzzle AVs require is a form of remote assistance or teleoperations capability. Ottopia’s founding team has a background in cybersecurity, video compression, and telecommunications and leveraged their expertise and vision to design and grow the company, combining their skills to develop and enhance its platform. Ottopia is one of the only providers to solve remote assistance issues with the critical components of teleoperations capabilities, including dynamic video compression, AI-based network optimization, safety systems, and cybersecurity; the latter two are exclusive to the company. With its strong overall performance, Ottopia earns Frost & Sullivan’s 2022 Market Leadership Award in the global teleoperations for the autonomous driving industry.

What You Need to Know about the Market Leadership Recognition

Frost & Sullivan's Market Leadership Award recognizes the company that achieved the greatest market share resulting from outstanding performance, products, and services.

Best Practices Award Analysis

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

Growth Strategy Excellence: Company demonstrates an ability to consistently identify, prioritize, and pursue emerging growth opportunities

Implementation Excellence: Company processes support efficient and consistent implementation of tactics designed to support the strategy

Brand Strength: Company is respected, recognized, and remembered

Product Quality: Products or services receive high marks for performance, functionality, and reliability at every stage of the life cycle

Product Differentiation: Products or services carve out a market niche based on price, quality, or uniqueness (or some combination of the three) that other companies cannot easily replicate

Technology Leverage: Company is committed to incorporating leading-edge technologies into product offerings to enhance product performance and value

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers are proud to own the company's product or service, and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and of high quality

About Frost & Sullivan

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The Growth Pipeline Engine™

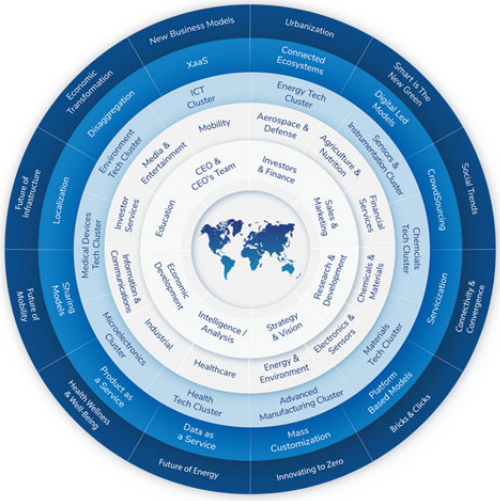
Frost & Sullivan's proprietary model to systematically create ongoing growth opportunities and strategies for our clients is fuelled by the Innovation Generator™.
Learn more.

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)