Research Report

Executive Summary:

Guidehouse Insights Leaderboard: Automated Driving Systems

Assessment of Strategy and Execution for 15 Companies Developing Automated Driving Systems

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Sam Abuelsamid

Principal Research Analyst

Scott Shepard

Principal Research Analyst

Section 1
Executive Summary

1.1 Market Introduction

For the automated driving system (ADS) industry, 2020 proved to be just as challenging as it was for most business segments thanks to the COVID-19 pandemic. However, 2020 also helped to highlight business opportunities, particularly around the delivery market for automated vehicles (AVs). Nearly all ADS developers paused in-vehicle testing for anywhere from several weeks to several months during the first major wave of the pandemic as most regions went into some form of lockdown. By late summer 2020, ADS companies modified their vehicles and their procedures to enable testing to safely resume.

For the 2021 edition of this *Leaderboard* report, Guidehouse Insights has changed the focus somewhat away from the companies that are directly commercializing AVs to those that are developing the actual ADS. In some cases, the companies being ranked in this report are both developing the technologies and developing the end-user services, such as Waymo, Cruise, and Zoox. In other cases, such as Argo AI, AutoX, and Aurora, the companies are partnering with OEMs or other mobility providers that will operate the end-user services.

All 15 companies profiled in this report are also developing ADSs that will be applied to light to medium duty vehicles, although several are also developing systems for medium and heavy duty applications, such as Waymo and Aurora. Companies that are exclusively focused on the heavy duty, long-haul trucking market have not been included in this report but will be included in a future *Leaderboard* report focused on that segment. Many of the companies included in this report have been operating pilot commercial deployments, which are generating revenue, albeit limited. This includes Waymo, Motional, Gatik, Nuro, and May Mobility. Waymo even began offering truly driverless rides in Arizona in mid-2020 in a limited portion of its service area. Larger-scale commercial deployments that are still small compared with the overall transportation market are anticipated to begin in 2022 and 2023. The deployments are slowly ramping up with a mix of goods delivery and passenger rides.

1.2 The Guidehouse Insights Leaderboard Grid

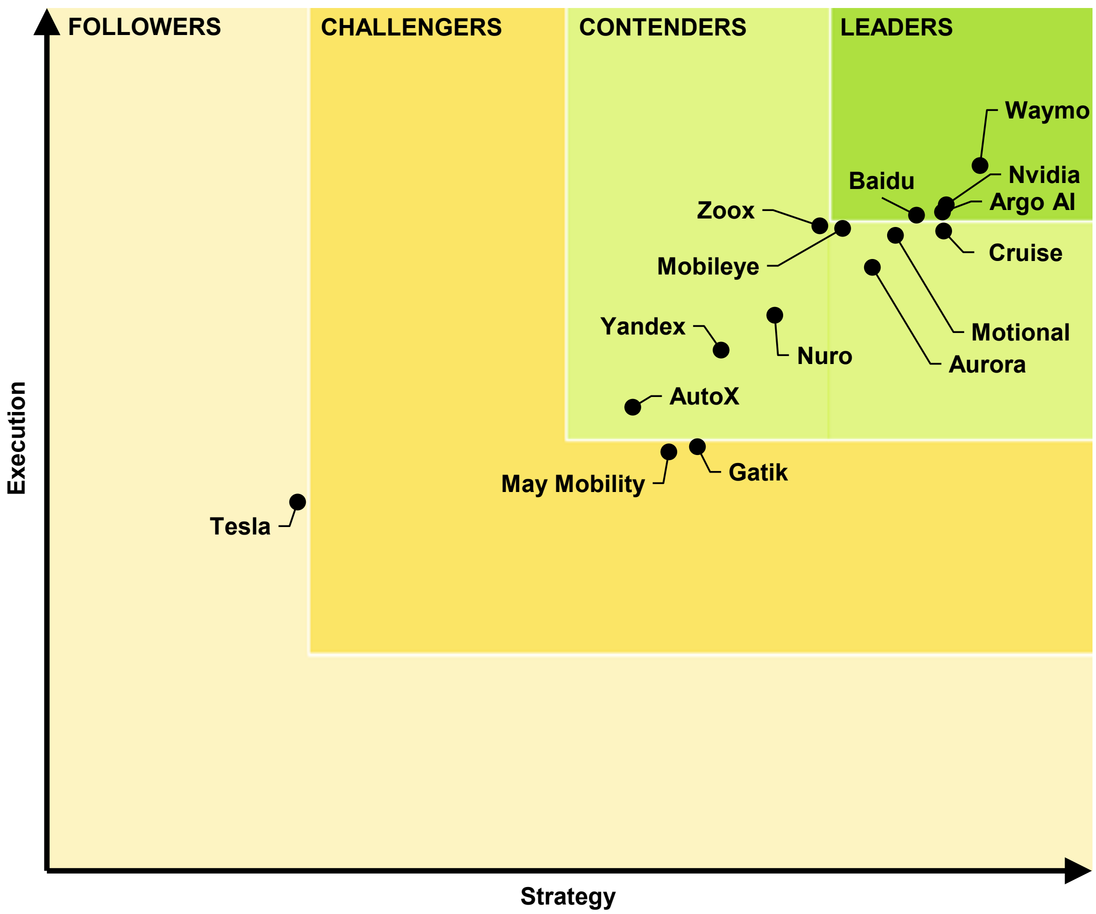
The criteria by which manufacturers are compared in this *Guidehouse Insights Leaderboard* include the following:

- Vision
- Go-to-Market Strategy
- Partners
- Production Strategy
- Technology
- Sales, Marketing, and Distribution
- Commercial Readiness
- R&D Progress
- Product Portfolio
- Staying Power

Detailed descriptions of each criterion are provided in the Criteria Definitions section of this report. Scoring is based on an assessment of each company. Details examined include current deployment of ADSs and partnerships with other companies in the ecosystem including OEMs, suppliers, and service providers. Other criteria cover technological maturity, funding, and commitment to the longer-term goals of AVs. With the change in focus from automated driving (AD) deployment companies to ADS platform developers, many of the companies ranked in prior years are no longer included, but partnered companies, such as Argo AI and Aurora, are.

Chart 1-1 shows the ranking of each company. This year, four companies had scores that earned a place in the Leaders group: Waymo, Nvidia, Argo AI, and Baidu. Several others, including Cruise, Motional, Mobileye, Zoox, and Aurora, fell just outside of this group among the eight companies in the Contenders group. Notably, Tesla continues to rank at the bottom of this list despite getting significant press attention for its full self-driving (FSD) beta software release. Although several of the companies ranked this year have close affiliations with automakers, Tesla is the only automaker on the list and has made marketing FSD a key feature in selling vehicles. Tesla has made significant progress in strengthening several areas including staying power thanks to the runup in its stock price in the second half of 2020, but its technology is still lacking.

Chart 1-1. The Guidehouse Insights Leaderboard Grid



(Source: Guidehouse Insights)

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8.1 Scope of Study

Guidehouse Insights has prepared this *Leaderboard* to assess the relative strengths of the global participants in the emerging market for ADSs. The *Leaderboard* is intended to help potential end users of those vehicles—including municipalities, fleet owners, and Tier One and Tier Two suppliers—to better understand which companies are leading the development of self-driving technology and which are lagging.

This *Guidehouse Insights Leaderboard* focuses on current companies that are developing ADSs for light duty vehicles for goods delivery or carrying passengers. The companies selected are developing full-stack solutions and in some cases are also developing or deploying mobility services solutions for the deployment of this technology. The services may be operated by the ADS developer or provided as a white label solution to third-party operators. This *Leaderboard* is not exhaustive, as there are many smaller players in the market that were not included because of their lack of geographic reach or technological capability.

The major objective of this *Leaderboard* is to provide a timely overview of the companies involved in this market, as well as their Strategy and Execution scores in developing, manufacturing, and marketing AD features. Note that the company rankings capture each company's standing at the time of the *Leaderboard*. They also consider a retrospective of past accomplishments and an expectation of future business moves based on public statements and Guidehouse Insights evaluations of the technology in development. The ratings are likely to change further over time as this market matures and business models continue to evolve.

8.2 Sources and Methodology

Guidehouse Insights' industry analysts use a variety of research sources in preparing Research Reports. The key component of Guidehouse Insights' analysis is primary research gained from phone and in-person interviews with industry Leaders including executives, engineers, and marketing professionals. Analysts are diligent in ensuring that they speak with representatives from every part of the value chain, including but not limited to technology companies, utilities and other service providers, industry associations, government agencies, and the investment community.

Additional analysis includes secondary research conducted by Guidehouse Insights' analysts and its staff of research assistants. Where applicable, all secondary research sources are appropriately cited within this report.

These primary and secondary research sources, combined with the analyst's industry expertise, are synthesized into the qualitative and quantitative analysis presented in Guidehouse Insights' reports. Great care is taken in making sure that all analysis is well-supported by facts, but where the facts are unknown and assumptions must be made, analysts document their assumptions and are prepared to explain their methodology, both within the body of a report and in direct conversations with clients.

Guidehouse Insights is a market research group whose goal is to present an objective, unbiased view of market opportunities within its coverage areas. Guidehouse Insights is not beholden to any special interests and is thus able to offer clear, actionable advice to help clients succeed in the industry, unfettered by technology hype, political agendas, or emotional factors that are inherent in cleantech markets.

8.2.1 Vendor Selection

The companies included in this *Leaderboard* were chosen based on their activities and capabilities related to developing full-stack AD solutions for light duty vehicles including integrated software, sensing, and compute functionality. Those that are also participating in the business model development and targeting multiple market segments may get additional credit on scores. Although many startup companies are developing a variety of solutions for AD, many have remained in stealth mode and have revealed few if any details of what they are doing. Companies that have such limited information available have not been included in the formal scoring. As is often the case for startups, many of these companies are likely to either go out of business or be acquired by a larger company.

8.2.2 Ratings Scale

Companies are rated relative to each other using the following point system. The ratings are a snapshot in time, showing the current state of the company. These scores are likely to be fluid as new competitors enter the market and customer requirements evolve.

- Very Strong 91 – 100
- Strong 76 – 90
- Strong Moderate 56 – 75
- Moderate 36 – 55
- Weak Moderate 21 – 35
- Weak 11 – 20
- Very Weak 1 – 10

8.2.2.1 Score Calculations

The scores for Strategy and Execution are weighted averages based on the subcategories. The overall score is calculated based on the root mean square of the Strategy and Execution scores.

8.2.3 Criteria Definitions

8.2.3.1 Strategy

- **Vision:** Measures the company's stated goals in designing market solutions against the actual needs of customers based on the entire environment in which they will operate. Clear and compelling visions that are effectively communicated to the industry result in higher scores.
- **Go-to-Market Strategy:** Evaluates the company's strategy for reaching the target market, including the sales and marketing channels to be used, as well as the processes established for informing the target market about brand differentiation and unique product value.
- **Partners:** Measures the company's established partnerships with key organizations or companies that will provide an advantage in financial backing, sales, business, and product development. Affiliations with automakers that can provide vehicle platforms or that intend to use the ADS on their own branded vehicles earn credit. Partnerships with established vendors in the supply chain, as well as a track record of financial strength through fundraising or profitable product sales, positively affect scores in this *Guidehouse Insights Leaderboard*.
- **Production Strategy:** Evaluates the long-term competitiveness of the manufacturing plan as an effective solution that satisfies market requirements and meets market capacity needs. A component of this is an evaluation of the ability of the manufacturing base to supply product quality to meet market expectations and demand.
- **Technology:** Evaluates whether the company has developed and patented technology that provides a significant business advantage over competitors that is likely to have an enduring impact on its success. Higher scores are given if the company's technology is already a proven market success or delivers unique product attributes.

8.2.3.2 Execution

- **Sales, Marketing, and Distribution:** Evaluates the company's marketing and sales performance and current distribution channel. Higher scores are given to companies with a presence in multiple regions and a network of partnerships with automakers and suppliers.
- **Commercial Readiness:** Evaluates the maturity level of the ADS being developed the likely place on the timeline to scaled commercial deployment. Higher scores are given to companies that have conducted successful public pilot programs or even begun low volume commercialization.
- **R&D Progress:** Evaluates the degree of development progress made on the ADS and innovations created by that company. This may include progress on developing specific hardware such as sensors or compute that may provide a competitive advantage as well progress on developing vehicles specifically for ADS applications.
- **Product Portfolio:** Addresses the products' relative competitiveness in and suitability to the market. Points are awarded for developing ADSs that can be applied to a broader range of use cases including compact delivery bots, larger passenger or delivery vehicles and large trucks.
- **Staying Power:** Evaluates whether the company has the financial resources to withstand weak or variable markets and price-based assaults by competitors. Also measures the company's likelihood to continue to pursue vehicle products in the event of market softening. Higher scores are given to companies with better financial performance and more capability to survive market downturns.

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2941 Fairview Park Drive, Suite 501
Falls Church, VA 22042
www.guidehouseinsights.com

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Guidehouse Insights Leaderboard: Automated Driving Systems

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