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FUTURE IMPACT

TECHNOLOGY  
SOFTWARE  
CONSULTING

**P3** BUSINESS  
AS UNUSUAL

# P3 AD Market Insights

**Edition #5/2024**

We analyze global autonomous driving ecosystems in Mobility-as-a-Service, Privately Owned Vehicles and Goods Transport.

## Created by:

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Last update: **2024/12/03**

**Edition #5/2024**



[www.p3-group.com](http://www.p3-group.com)

Autonomous Driving  
Market Intelligence  
MaaS / TaaS / POV





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P3 autonomous mobility



AD Market Insights – CN edition



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# P3 & P3 autonomous mobility.

**Short** Introduction





# Portfolio as unusual.

## SOFTWARE

Android Automotive

Business Intelligence

Cloud Migration

Cyber Security

Data Analytics

Enterprise Solutions

Financial Systems

IT-Architecture

Certifications

## TECHNOLOGY

Autonomous Driving

Battery Technology

Electric Powertrain

Energy Solutions

Industrialization

Charging Infrastructure

Operations Excellence

Task Force Management

Testing & Engineering

## CONSULTING

Agile Transformation

Artificial Intelligence

M&A Strategy

Marketing & Design

Sustainability

Project Management

"Organizational Strategy"

Quality & Compliance

Systems Engineering

UX/UI Design

Transformation



# P3 advises leading international OEMs, suppliers, technology and insurance companies in the field of autonomous driving and autonomous mobility.



AUTONOMOUS MOBILITY  
/AS UNUSUAL

>9

years of international  
experience in autonomous  
driving consulting

>100

customers worldwide and  
more than 300 successful  
AD projects

>50

employees around the  
globe in the autonomous  
driving space

75%

of the employees are  
engineers and software  
developers

We approach autonomous driving from many different perspectives. We understand the markets, know the players, but also have the technological know-how and the necessary software expertise.

## Market & Strategy

- Go-to-market strategy
- Global market and competitive analysis for AD MaaS, TaaS & ownership
- MaaS & TaaS business model development incl. business case & TCO
- Competence analysis, assessment of “best-fit” partners
- (SDS) partnerships models and joint venture agreements
- AD shuttle / robotaxi and ADAS in-field testing & benchmarking

## Technology & Regulation

- End-to-end architecture assessment and customization
- Cybersecurity, Functional Safety & SOTIF
- Regulation Implementation (AD SMS, SUMS & CSMS for SAE L3 & L4)
- Test Strategies & Management & Tool Confidence
- Sensor set evaluation and platform fortification strategies
- Support for Homologation (Type approval ODD and operation area)

## Operations & Scaling

- AD Program Management incl. strategic setup, operations strategy, organizational build-up, project conduction & benchmarking
- Scaled Pilots: setup and management of runup schemes for AD pilot projects
- AD Product Lifecycle Management AD Logistics Concepts - Conceptualization of market-ready TaaS products

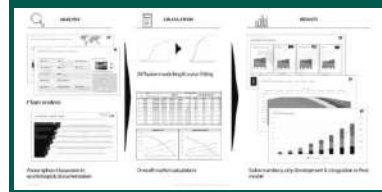




# Overview | Market & Strategy Portfolio



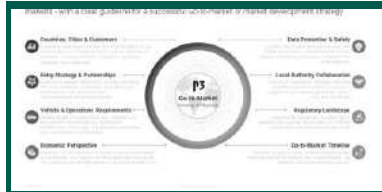
Robotaxi Performance &amp; UX Benchmark



AD Market Models L2+/L3/L4



AD Tech Partner Scouting &amp; Analysis



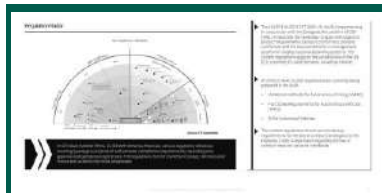
Go-to-Market Strategy



ADAS Benchmark



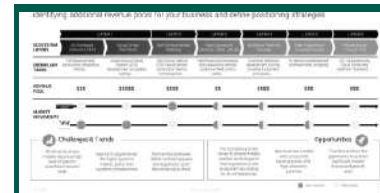
AV Fleet Simulation (MaaS &amp; Trucking)



AD Regulation Radar EU/CN/US



TCO Tools for MaaS, TaaS, and Trucking



Value Chain and Positioning Strategy

**P3 AD market, strategy, and technology intelligence portfolio**

Working closely with our Technology & Regulation and Operations & Scaling teams, we provide holistic market, competitor, and technology intelligence and strategy development for your specific needs.



# P3 autonomous mobility. What's new?





## What's new?

# ADAS MARKET INSIGHTS!

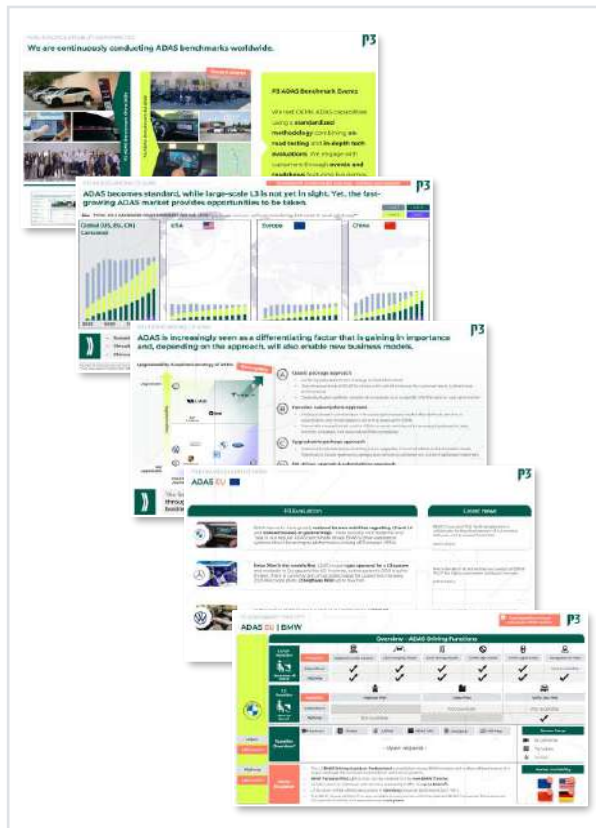
The **P3 AD Market Insights** have **gotten a sibling**: The **P3 ADAS Market Insights** are finally here!

This new report offers **fascinating insights into SAE Level 2/2+ and Level 3 ADAS** function packages of **global OEMs and their ADAS capabilities across North America, Europe, and China**, with focus on driving functions, revealing the strategies manufacturers are using to stay competitive in this fast-evolving market.

In this comprehensive ADAS Market Insight report, you'll find:

- ✓ Detailed **competitor analysis, including OEM ADAS functions, supplier overviews, sensor setups and market availability**
- ✓ An overview of **the essential components driving ADAS performance**
- ✓ Exclusive **insights into the latest company-specific news** with P3's expert assessment
- Whether you're an OEM, supplier, or just interested in the future of automotive technology, this report is a must-read!

[Download the first edition here](#)





## What's new?



# NEW WHITEPAPER!

Our new white paper is here! Together with **rms GmbH** and we have explored the **potentials and challenges of autonomous on-demand transport in Germany**, enriching the discussion with our own experiences and insights.

The paper provides well-founded insights and forward-thinking recommendations on key aspects of this cutting-edge technology.

We have closely examined the following areas and derived initial approaches to solutions:

- ✓ **Current Status** of Autonomous On-Demand Transport **in Germany**
- ✓ **Public Perception and Acceptance** – How do fears and misconceptions influence usage, and how can we counteract them?
- ✓ **Project Sustainability** – What obstacles exist for autonomous on-demand projects in public transport? How can model regions help close knowledge gaps and establish sustainable solutions?
- ✓ **Technology and Regulation** – What is the current state in Germany, and which barriers need to be overcome?
- ✓ **Economic Framework and Realities** in implementing autonomous mobility in Germany
- ✓ Particularly exciting: **Best practices and insights from the KIRA project** – Germany's first initiative testing and implementing Level 4 autonomous vehicles in public transport.

[Download here](#) [German only]



## What's new?

# PAVE EUROPE

### Building Trust: the Road to Public Acceptance of Autonomous Vehicles



**Ingrid Skogsmo**  
Senior Researcher in London for  
Future Mobility  
VTI



**Ana Rolos**  
Manager European Policy  
& Government Affairs  
Wipacru



**Ricco Kämpfer**  
Senior Consultant & Team  
Lead Autonomous Driving  
Market & Strategy  
P3



**Michael Hendrich**  
Consultant, Economics  
Mobility  
P3



# NEW WEBINAR!

As autonomous vehicle technology advances, critical factors influence public trust and acceptance of AVs.

Being a proud **PAVE Europe member and leader of Working Group 1** (Understanding, Trust and Acceptance), we had the pleasure to be part of this webinar.

The discussion aimed to **demystify AV technologies, confront public concerns, and highlight the challenges and opportunities** on the road to widespread adoption.

The webinar considered **real-world case studies, regulatory frameworks, public perceptions, and the social implications of AVs**, ultimately providing an understanding of the journey toward building trust in autonomous mobility.

Additionally, this **webinar offers an outlook on the first whitepaper created by the working group**, aimed at the general public, which will be published soon.

[Click here to watch  
the webinar](#)

[Click here to learn  
more about PAVE  
Europe](#)



# P3 AD Market Insights.





## Let's start: P3 AD Market Insights Introduction.



Companies focusing on  
autonomous **MaaS**



Companies focusing on  
**privately owned vehicles**



Companies focusing on **goods  
transport and TaaS**

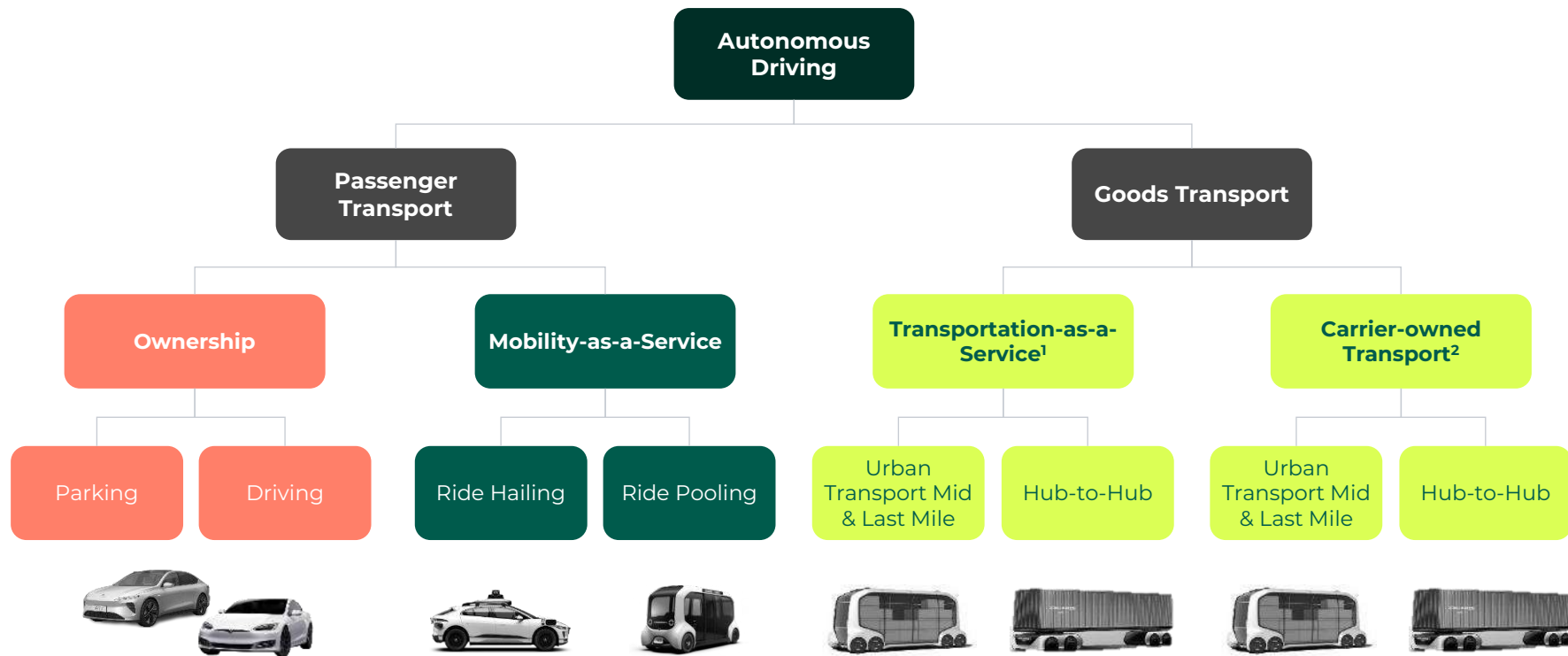
We **analyze** global Autonomous Driving **value creation networks and ecosystems** using **Layer Models** and **provide overviews** of **MaaS, ownership & goods transport use cases**

**Based on their** respective **core business**, we identify **(strategic) partnerships, investments** or **acquisitions** of **specific market players** and place them in the layer model. We focus on **North America, Asia** (China, Japan and Korea) and **Europe**

All **insights are based on publicly available sources**. Project knowledge or other **non-publicly available information is not considered**.  
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# Autonomous Driving Use Cases.



¹ Self-driving truck provider owns and operates the truck and offers transport / capacity on demand  
² Customer / carrier owns and operates trucks and pays a per-mile fee to the SDS / truck provider



## What you'll find in this report.

### 1 Mobility-as-a-Service (MaaS)

MaaS | **Intro**

MaaS | **NAR**

MaaS | **Asia**

MaaS | **Europe**

### 2 Privately Owned Vehicles (POV)

POV | **Intro**

POV | **NAR**

POV | **Asia**

POV | **Europe**

### 3 Goods Transport & Transport-as-a-Service (TaaS)

Goods Transport & TaaS | **Intro**

Goods Transport & TaaS | **NAR**

Goods Transport & TaaS | **Asia**

Goods Transport & TaaS | **Europe**



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# Mobility-as-a-Service.

Intro | Use Cases & Layer Description



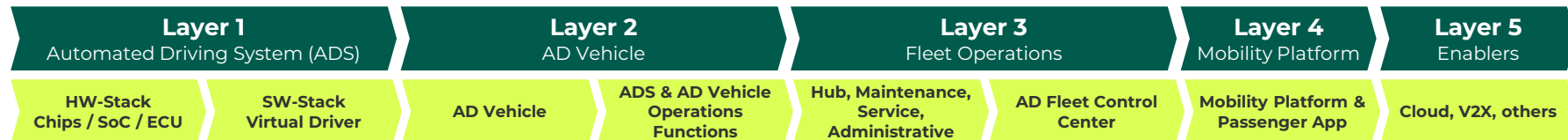


## MaaS | Use Cases

							
			Gated Area	Highway	Urban	Suburban	Rural
			Airport, factories, yards, harbors, ...	Highways, freeways, ...	City center, designated streets, ...	Federal highway, residential areas, ...	Rural roads, gravel road, ...
Ride Hailing	S		-	Robotaxi			
	M		-	Robotaxi			
Ride Pooling	ML		low speed autonomous shuttle (<25km/h)	-	low speed autonomous shuttle (<25km/h)		
	M		(private) robo shuttle	robo shuttle			
	L		(private) robo shuttle	robo shuttle			
	XL		(private) robo bus	robo bus			



## MaaS | Layer Model Description



The **Automated Driving System (ADS)** encompasses SW and HW required to achieve Level 4 autonomy.

The HW-Stack involves activities such as hardware development, production, testing, automotive approval, and safety compliance.

The SW-Stack focuses on self-driving software development and includes activities such as testing & simulation, ODD (Operational Design Domain) management, SDS licensing, mapping, sensor data processing, E2E integration, and safety compliance.

**AD Vehicles** are considered L4 ready vehicle platforms. This layer centers on the development and design and include tasks such as platform & system architecture, regulatory compliance, safety concept, homologation, logistics, and production.

ADS & AD Vehicle Operations Functions describe all functions and interfaces required for AD-MaaS specific tasks performed by the Fleet Control Center and Remote Operator such as remote vehicle control, cabin and rider monitoring, operator & emergency call and remote ADS control/assistance.

**Fleet Operations** covers operational activities for AV fleets. Tasks include maintenance, service and repair, financing, concessions, charging, training, cleaning or parts supply.

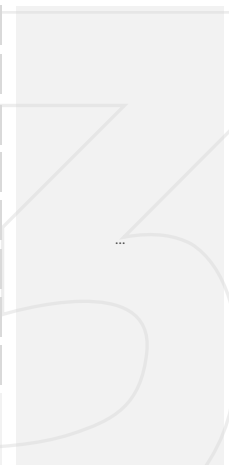
Moreover, AD Fleet Control Center tasks include the execution of ADS & AD Vehicle Operations Functions (e.g., cabin and rider monitoring or remote ADS assistance) in a fleet management tool / user interface. It also includes typical fleet management tasks such as mission management, health monitoring or maintenance & charging scheduling of the AV fleet.

The **Mobility Platform** is the rider frontend. It is point of sale and provider of the primary communication and interaction channel with the user. Tasks include booking, pricing, payment as well as vehicle assignment and dynamic routing (fleet intelligence features). Rider experience (e.g., music, entertainment) may also be covered by mobility platforms.

**Enablers** especially include cloud infrastructure and data centers for processing and storing large amounts of AV data. Furthermore, particularly in China, V2X is a key pillar in pilot zones, enabling faster AV deployment and collaborative decision-making.



# MaaS | Layer Model Description

Layer 1 Automated Driving System (ADS)		Layer 2 AD Vehicle		Layer 3 Fleet Operations		Layer 4 Mobility Platform	Layer 5 Enablers
HW-Stack Chips / SoC / ECU	SW-Stack Virtual Driver	AD Vehicle	ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others
HW Development	SW Development	Design & development	Remote vehicle control	Hub Setup	Execution of ADS & AD Vehicle Operations Functions in UI	Rider App	V2X
HW Production	Testing & Simulation	Quality assurance	Rider authentication	Financing / Insurance		Booking	3 <sup>rd</sup> party HD maps
Sensor Integration	ODD Management	Redundancy	Cabin & rider monitoring	Concessions	AD Vehicle Real-Time Tracking and Monitoring	Pricing	Cloud Infrastructure
Automotive approval	SDS Licensing	X-by-Wire	Departure control	Charging	Incident Management	Payment	
Sensor testing & approval	SW Testing & Approval	Regulatory compliance	Rider interfaces & assistance	Maintenance, Service, Repair	AD vehicle Maintenance Scheduling	Dynamic Routing & Optimization	
Sensor fusion	Mapping	Homologation	Operator & emergency call	Small Repair	AD Vehicle Charging Scheduling	Demand Prediction	
Calibration and Integration Support	Verification & Validation	After sales / aftermarket	ADS mission control	Washing & Cleaning	Emergency Response Coordination	Pooling Algorithms	
Safety & Compliance	E2E Integration	Safety concept	Telemetry, Monitoring & Diagnostics	Parts supply	AD Vehicle Mission Dispatch	API / Integration	
...	Sensor Integration and Data Processing	AD requirements	Remote ADS Assistance	In/De-fleeting	Safety Driver Management	Customer Support	
	Safety & Compliance	Logistics	Remote ADS Troubleshooting	Training	Data Analytics and Reporting	3 <sup>rd</sup> Party connection	
		Production	Data Management	In-field support	Customer interaction	Data Analytics	
		Battery & charging concept	E2E integration	...	...	...	
		...	...				



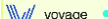




# Mobility-as-a-Service. NAR.























































Partnering & Value Chain, Level 4 Target & Latest News


























Layer 1		Layer 2		Layer 3		Layer 4		Layer 5							
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions		Hub, Maintenance, Service, Administrative		AD Fleet Control Center		Mobility Platform & Passenger App		Cloud, V2X, others	
Sensors	Chips, SoC, ECU, DCU, ...	Virtual Driver	Simulation, V&V, ...	AD Vehicle	Components	Cabin Monitoring, Vehicle Control & Remote Assistance Functions	Hub Operations, Maintenance, Service, Administrative	Fleet Control Center & Remote Assistance UI	Mobility Platform, MaaS Intelligence, Rider Experience	3rd party Maps	Cloud	V2X & others			
 WAYMO	 INTEL  NVIDIA	 WAYMO		 STELLANTIS  JAGUAR  ZEEKR  HYUNDAI 		 ZEEKR  WAYMO	 AVIS  AutoNation  Swiss Re  transdev	 WAYMO	 WAYMO  lyft  Google Maps  Uber			Undisclosed			
 STROBE  ASTYX  OUSTER	 Qualcomm  NVIDIA	 voyage		 gm  HONDA		cruise	cruise	cruise	cruise  lyft  Uber		 Microsoft				
 LUMINAR  mobileye  INNOVIZ	 mobileye	 mobileye		 NIO  HOLON  SCHAEFFLER  VW  Commercial Vehicle  MAN		ADMT	 DB  holo  beep  SXT  EMT	 MOIA  holo  moovit  beep	 MOIA  moovit  Ruter#  IOI  lyft 			Undisclosed			
Core Business		Partnership or supplier deal		Investment		Acquisition		Parent / Subsidiary		Update					




























Layer 1		Layer 2		Layer 3		Layer 4		Layer 5								
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions		Hub, Maintenance, Service, Administrative		AD Fleet Control Center		Mobility Platform & Passenger App		Cloud, V2X, others		
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 	 							Undisclosed								
Core Business		Partnership or supplier deal		Investment		Acquisition		Parent / Subsidiary		Update		Partner outside US				



Layer 1				Layer 2			Layer 3		Layer 4		Layer 5		
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 OUSTER	 NVIDIA	ADASTEC		 KARSAN		ottopia	 VW	ottopia  APPLIED AUTONOMY	 Kolumbus 		aws	AECOM	
 FLIR													
 AVRIDE	 NVIDIA	AVRIDE		 HYUNDAI MOTOR GROUP		Undisclosed	Undisclosed	Undisclosed	Uber 			Undisclosed	
 Aurora	 NVIDIA	Uber ATG  		 TOYOTA		Aurora	 TOYOTA	Aurora	Uber		aws		
 Blackmore													
 OURS													
 DENSO Corporation													
 HESAI													
<div>Core Business</div> <div>Partnership or supplier deal</div> <div>Investment</div> <div>Acquisition</div> <div>Parent / Subsidiary</div> <div>Update</div> <div>Partner outside US</div>													



Layer 1				Layer 2				Layer 3		Layer 4	Layer 5		
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 Ouster  Lidartech	 Horizon Robotics	COAST		COAST		COAST	COAST	COAST	Undisclosed			 d3-Cities	
 SICK  Ouster  DENSO Crafting the Care	 intel	 PERRONE ROBOTICS	 WIND  aicas	 PERRONE ROBOTICS  GreenPower Robotics  rampart  LIGHTNING ROBOTICS  tropos		 guident	 SP SUSTAINABILITY  Coral Systems Group  First Transit	 Liftango  guident  First Transit	 Liftango			 verizon	



## At a glance



Working **15+ years** towards **autonomous driving**, Waymo's virtual driver is the world's **most experienced one**. The fully driverless I-PACE fleet in Phoenix, SF and LA impresses with a **terrific system performance**. In our view and bases on our benchmark rides, Waymo is **currently ahead of competition** in the AV space.



Cruise operated a **commercial robotaxi service** in **San Francisco**, which is currently not **available due to several incidents involving its robotaxis and both trust & acceptance issues and lost permits**. Recently, Cruise re-started supervised autonomous driving with safety drivers in Phoenix.



Mobileye is **testing its AV fleet in various locations around the globe**, including complex European traffic. First promising **pilot projects in Norway (Oslo) and Germany are to come** - these **will show what the system is capable of** and how well it performs compared to competitors.



May's fleet is already **available to the general public** in many cities. The **SDS is designed for multiple vehicle platforms** and used in the Toyota Sienna Autono-MaaS vehicles, among others. The approach to enhance public transport instead of offering robotaxi services is pretty unique in the US

## Latest news

Waymo One is now open to all in Los Angeles.

(12.11.2024)

[Update](#)
[Read](#)

GM's Cruise to pay \$500,000 fine to DOJ, admits submitting false report.

(15.11.2024)

[Update](#)
[Read](#)

Lyft and Mobileye team up to enable autonomous mobility at scale.

(06.11.2024)

[Update](#)
[Read](#)

May Mobility to test driverless shuttles in Ann Arbor.

(20.11.2024)

[Update](#)
[Read](#)

## L4 target

L4 achieved in Phoenix by **2020**.

L4 achieved in SF by **2022**.

Not announced

L4 achieved in Sun City by late **2023**.



## At a glance



JV of Hyundai and Aptiv, while the latter reduced its common equity interest from 50% to about 15% by end of March 2024. In this course, **Hyundai has agreed to invest nearly \$1 billion in Motional by 2024**. The demise of Motional has thus been averted for the time being.



Zoox is **meanwhile testing its SPV on public roads in the bay area**. Currently, only employees are eligible to take rides. In late 2024, Zoox announced to start offering rides starting with employees. First deployments will be in the SoMa neighborhood of San Francisco, and on the Las Vegas Strip.



Unlike most MaaS providers, ADASTEC is not focusing on robotaxis but developing an **AV stack for transit buses**, which marks a USP in the market. ADASTEC has deployed buses in several locations including the US and Europe.



Avride is the **rebranded, international division** of the robotaxi and delivery robot company **Yandex Self-Driving Group**. While international assets have been separated from Yandex assets, Avride is testing AVs in diverse ODDs across the globe, focusing on safety. **Uber will be a key partner for MaaS and delivery.**

## Latest news

CEO of self-driving startup Motional is stepping down.

(18.09.2024)

[Read](#)

Zoox custom robotaxis are finally coming to San Francisco and Las Vegas.

(30.10.2024)

[Update](#)

[Read](#)

Karsan launches Autonomous e-ATAK for driverless public transport in Switzerland!

(19.08.2024)

[Read](#)

Uber taps Yandex spinout Avride for autonomous delivery and ride-hail partnership.

(03.10.2024)

[Update](#)

[Read](#)

## L4 target

**2026**

Large scale production in **2026.**

Not announced

Not announced



## At a glance



While Aurora shifted its **focus primarily to self-driving trucks** some time ago, it has been **quiet about its robotaxis**. We believe: the **company needs a working business case**, otherwise it will become a victim of market consolidation. MaaS is therefore probably not part of the business for now.



The company provides MaaS solutions for cities, theme parks, campuses, airports, rail yards, and other private sites. In the meantime, **COAST seems to be focusing primarily on use cases other than passenger transport** (e.g., harvesting, ports). However, transport currently seems to be the primary use case.



Perrone been **developing autonomous vehicle solutions since 2003**. Apart from its low-speed shuttles, Perrone claims to have **outfitted over 30 vehicles types with its retrofit kit**. Despite its experience, we don't believe Perrone will become a leading market player.

## Latest news

Self-driving vehicle company Aurora cuts 3% of its workforce.

(24.01.2024)

[Read](#)

COAST Autonomous announces collaboration with the city of Winter Haven, Florida to explore deployment of autonomous transportation solutions.

(30.03.2022)

[Read](#)

Perrone Robotics to deploy fleet of Autonomous Ford E-Transit vans for Detroit's 'Connect' program, a two-way 10-mile autonomous vehicle shuttle route.

(02.04.2024)

[Read](#)

## L4 target

Not announced

Not announced

Not announced




























































































# Mobility-as-a-Service. Asia.


























































Partnering & Value Chain, Level 4 Target & P3 Assessment


















































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 robosense   	   			     				 			 	 	  	  		
 robosense	  			     	 		  			     	Undisclosed					
 robosense  (Sensor fusion)	  			    	 		     	 	      							
Core Business		 Partnership or supplier deal		 Investment		 Acquisition		 Parent / Subsidiary		 Update		 Partner outside CN				



































Layer 1				Layer 2				Layer 3		Layer 4	Layer 5						
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions		Hub, Maintenance, Service, Administrative		AD Fleet Control Center		Mobility Platform & Passenger App		Cloud, V2X, others			
Sensors	Chips, SoC, ECU, DCU, ...	Virtual Driver	Simulation, V&V, ...	AD Vehicle & Operations	Components	Cabin Monitoring, Vehicle Control & Remote Assistance Functions		Hub Operations, Maintenance, Service, Administrative		Fleet Control Center & Remote Assistance UI		Mobility Platform, MaaS Intelligence, Rider Experience		3 <sup>rd</sup> party Maps	Cloud	V2X & others	
     				      								 					
   	 				    		 								 		
  					 		Undisclosed		Undisclosed		 曹操专车运营平台		 曹操专车运营平台		 		
Core Business  Partnership or supplier deal  Investment  Acquisition  Parent / Subsidiary  Update																	



Layer 1				Layer 2			Layer 3		Layer 4	Layer 5		
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others		
Sensors	Chips, SoC, ECU, DCU, ...	Virtual Driver	Simulation, V&V, ...	AD Vehicle	Components	Cabin Monitoring, Vehicle Control & Remote Assistance Functions	Hub Operations, Maintenance, Service, Administrative	Fleet Control Center & Remote Assistance UI	Mobility Platform, MaaS Intelligence, Rider Experience	3 <sup>rd</sup> party Maps	Cloud	V2X & others
robosense  	     	        	  	               			Undisclosed	Undisclosed	Undisclosed		  	
Not relevant		 		  ONTIME integrates 3 <sup>rd</sup> party fleets		Undisclosed	Undisclosed				Undisclosed	
Core Business Partnership or supplier deal Investment Acquisition Parent / Subsidiary Update												



Layer 1				Layer 2			Layer 3		Layer 4	Layer 5		
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others		
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    	   	   					Undisclosed	Undisclosed		 		
	 	 			 	Undisclosed	Undisclosed	Undisclosed	Undisclosed	Undisclosed		
TIER IV		 TIER IV	TIER IV	  TIER IV 		Undisclosed		Undisclosed	 			Undisclosed





Layer 1				Layer 2			Layer 3		Layer 4	Layer 5		
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others		
Sensors	Chips, SoC, ECU, DCU, ...	Virtual Driver	Simulation, V&V, ...	AD Vehicle	Components	Cabin Monitoring, Vehicle Control & Remote Assistance Functions	Hub Operations, Maintenance, Service, Administrative	Fleet Control Center & Remote Assistance UI	Mobility Platform, MaaS Intelligence, Rider Experience	3 <sup>rd</sup> party Maps	Cloud	V2X & others
•		•	•			Undisclosed	Undisclosed	Undisclosed	Easy  Ride •			
•	•	•	•			•	•	•	•			Undisclosed
• 42dot •		42dot		• 42dot •		Undisclosed	Undisclosed	42dot • GEO TAB • •	•			Undisclosed





Layer 1				Layer 2			Layer 3		Layer 4	Layer 5		
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others		
Sensors	Chips, SoC, ECU, DCU, ...	Virtual Driver	Simulation, V&V, ...	AD Vehicle	Components	Cabin Monitoring, Vehicle Control & Remote Assistance Functions	Hub Operations, Maintenance, Service, Administrative	Fleet Control Center & Remote Assistance UI	Mobility Platform, MaaS Intelligence, Rider Experience	3 <sup>rd</sup> party Maps	Cloud	V2X & others
LUMINAR AISIN DENSO ZF robosense	NVIDIA QVoo MAY Mobility IgA Level 5 momenta	Aurora pony.ai parallel domain Apex.AI Level 5 momenta	Applied Intuition parallel domain Apex.AI	TOYOTA		Undisclosed	Undisclosed		Aurora RIDECELL	Grab Uber DiDi	CARNERX AWS NTT DATA MAXAR here	PERCEPTIVE AUTOMATA
APTIV OUSTER ZENDAR opsys Technologies	APTIV NVIDIA	WAYMO Motional Aurora pony.ai 42dot Baidu IONQ	Motional	HYUNDAI MOTOR GROUP					Motional Grab AIRS i.M		here	
HESAI DENSO OTSL TIER IV	DENSO OTSL TIER IV	TIER IV		PIX moving TOYOTA TORAY	TIER IV Astemo	TIER IV	AMANE	TIER IV	NIHON KOTSU		Undisclosed	
Core Business ● Partnership or supplier deal ● Investment ● Acquisition ● Parent / Subsidiary ◆ Update												



## At a glance



**Baidu Apollo** has accumulated **more than 100m km**, holds **permits for first fully driverless taxi service** in CN and **processed >6m autonomous ride orders** by April 2024. Baidu is an absolute heavyweight in the Chinese AD market and among the strongest robotaxi players in China.



WeRide was the **first AD company in China** to operate a fleet with **>100 vehicles** for AD testing and was permitted to test **fully driverless cars** both in **China** and the **USA**. Considering >20mn autonomous kilometers, WeRide is among the strongest AD players.



Pony.ai is an **industry leader in the development and commercialization of robotaxi services** in China and is currently preparing to enter the European market. Pony.ai has formed partnerships with leading OEMs, including Toyota, SAIC, and GAC Group. Pony.ai is among the strongest AD players.



AutoX's **focus is on China and the Asia Pacific markets**. However, it also holds a permit to **transport passengers on public roads** in California. Based on our robotaxi rides, we currently see a lower level of maturity compared to other robotaxi competitors.

## Latest news

Baidu's supercheap robotaxis should scare the hell out of the US.

(22.11.2024)

[Update](#)
[Read](#)

WeRide announces the signing of an MOU with beti, a leading French automated mobility operator.

(21.11.2024)

[Update](#)
[Read](#)

Pony.ai goes public on Nasdaq.

(28.11.2024)

[Update](#)
[Read](#)

AutoX's RoboTaxi allowed for unmanned passenger transport service in Shanghai.

(08.07.2024)

[Read](#)

## L4 target

L4 reached in Guangzhou by **2021**

L4 reached in Guangzhou by **2022**

L4 reached in Beijing and Guangzhou by **2023**

L4 reached in Shenzhen by **2021**



## At a glance



Following an 18-month suspension by the Chinese authorities, Didi was permitted to sign up new users by 2023. Its **active user base was 500mn** in 2020, receiving **>40 bn trip requests daily**. This means great market power - however, it has become **quiet around DiDi's AV division**.



**DeepRoute claims to offer the most affordable SDS on the market.** In the meantime, DeepRoute has covered **10 million autonomous kilometers** on public roads by 09/23 and holds permission to carry passengers in China. The current focus seems to be rather on L2+ ADAS than robotaxis.



Horizon Robotics now has **partnerships with many well-known OEMs and Tier1s** with whom they are **jointly developing autonomous driving functions based on their Journey chip**. It is therefore a very strong AI-chip market player, without focusing on deploying own robotaxi fleets.



ONTIME (Ruqi Mobility) was founded by GAC Group and Tencent. Its business scope in terms of robotaxis is an **operation platform including remote supervision, remote management, remote control and remote evaluation**. ONTIME integrates fleets from partners such as GAC and Pony.ai and had a fleet of >280 vehicles by December 2023.

## Latest news

DiDi Autonomous Driving, GAC AION's joint venture to launch first L4 commercial Robotaxi in 2025.

(07.04.2024)

[Read](#)

DeepRoute.ai secures \$100 million in C1 funding round.

(05.11.2024)

[Update](#)

[Read](#)

Horizon Robotics' Journey series surpasses 7 million units in shipments.

(13.11.2024)

[Update](#)

[Read](#)

ONTIME starts commercial operations of Robotaxi in Zhuhai's Hengqin area.

(10.09.2024)

[Read](#)

## L4 target

2025

2025

Not announced

Not announced



## At a glance



By August 2022, SAIC accumulated **400,000km of automated driving testing** in China. SAIC has **partnered with well-known SDS providers**, such as Momena and Pony.ai, to develop self-driving vehicles.



FAW's focus is primarily on privately owned vehicles. However, **its EV brand Hongqi** and its **3rd-generation robotaxi** rides on the same platform as its mass-produced vehicle to achieve economies of scale. FAW **co-developed the Hongqi robotaxi with Baidu** and also **invested in tech company Pony.ai**.



PIX Moving shares the vision of rebuilding the city with a special form of vehicles called **Moving Spaces**. These **multi-functional pods** can serve as moving working spaces or vending machines, among others. Great concept for technology-driven Asian markets and beyond.



Nissan plans to offer **autonomous mobility services starting in Japan by 2027**, working closely with third parties such as local authorities and PTAs and relying on its **inhouse-developed, autonomous-drive system**. Initial trials started in 2024 with the goal to have 20 supervised demonstration vehicles on the roads between 2025 and 2026.

## Latest news

SAIC Motor set to launch autonomous driving services in Shanghai by August.

(25.07.2024)

[Read](#)

Hongqi's 3rd-gen L4 Robotaxi allowed for unmanned road tests in Beijing.

(10.07.2024)

[Read](#)

PIX Moving and SODA.Auto announce strategic partnership to accelerate autonomous vehicle development.

(04.09.2024)

[Read](#)

Nissan demos autonomous driving on streets of Yokohama.

(14.06.2024)

[Read](#)

## L4 target

**2025**

Not announced

Not announced

**2027**





## At a glance



Nissan plans to offer **autonomous mobility services starting in Japan by 2027**, working closely with third parties such as local authorities and PTAs and relying on its **inhouse-developed, autonomous-drive system**. Initial trials started in 2024 with the goal to have 20 supervised demonstration vehicles on the roads between 2025 and 2026.



Yutong is China's top bus manufacturer and the world's largest one. For the AD MaaS Case, Yutong provides its **purpose-built electric robobus**, which is already operating driverless on public roads in cooperation with SDS provider WeRide. Yutong **will thus remain true to its core business**.



Acquired by Hyundai Motor Group in 2022, 42dot is the **groups' global software center**. 42dot and Hyundai showcased 'software-defined vehicle' (SDV) technologies under development to lead to a **'Software-defined Everything' (SDx) ecosystem beyond mobility** at CES 2024.



In the AD space, Toyota is **focusing primarily on partnerships, investments and acquisitions**. The extensive portfolio includes, for example, Lyft Level 5, Momenta, Pony.ai or May Mobility. Toyota and Pony.ai are developing a robotaxi fleet of about 1,000 vehicles.

## Latest news

Nissan demos autonomous driving on streets of Yokohama.

(14.06.2024)

[Read](#)

WiTricity and YuTong Bus revolutionize public Transportation with Wireless Charging for Autonomous E-Buses.

(10.02.2023)

[Read](#)

Geotab, Kia, and 42dot join forces to drive the future of fleet management.

(12.09.2024)

[Read](#)

Pony.ai teams up with Toyota China, GAC Toyota on Robotaxi development.

(04.08.2023)

[Read](#)

## L4 target

**2027**

L4 reached by **2022** jointly with WeRide.

Not announced

**2024**





## At a glance



Hyundai and Aptiv jointly established **Motional** to develop robotaxis. Moreover, the **acquisition of 42dot** is **intended to strengthen capabilities**. We are curious to what extent Hyundai, apart from Motional, will therefore position itself in the AD business in the future.

TIER IV



TIER IV is a Japan-based company **specializing in Autoware-based AD solutions**. The company aims to make autonomous mobility technology scalable and accessible, collaborating globally to **advance AVs for different industries**. TIER IV participates in projects such as METI aimed at deploying robotaxis for transportation and autonomous trucks for logistics.

## Latest news

Waymo and Hyundai enter multi-year, strategic partnership.

(05.10.2024)

[Update](#)[Read](#)

TIER IV's AI Pilot system certified for Level 4 autonomous bus service in Nagano Prefecture.

(31.10.2024)

[Update](#)[Read](#)

## L4 target

**2026** (Motional)

Not announced






























































# Mobility-as-a-Service. Europe.







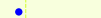





















Partnering & Value Chain, Level 4 Target & P3 Assessment













































Layer 1				Layer 2				Layer 3		Layer 4	Layer 5		
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others			
Sensors	Chips, SoC, ECU, DCU, ...	Virtual Driver	Simulation, V&V, ...	AD Vehicle	Components	Cabin Monitoring, Vehicle Control & Remote Assistance Functions	Hub Operations, Maintenance, Service, Administrative	Fleet Control Center & Remote Assistance UI	Mobility Platform, MaaS Intelligence, Rider Experience	3 <sup>rd</sup> party Maps	Cloud	V2X & others	
 				 Commercial Vehicles		ADMT 	MOIA 	MOIA 	MOIA 			Undisclosed	
 				 	 	 Undisclosed	  	  MOIA  	   				
  	 	 		 Applied EV NEVS 		Undisclosed	   	 	 ocado 			 	
<div>Core Business</div> <div> Partnership or supplier deal</div> <div> Investment</div> <div> Acquisition</div> <div> Parent / Subsidiary</div> <div> Update</div> <div>  Partner outside Europe</div>													



Layer 1				Layer 2				Layer 3		Layer 4	Layer 5		
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others			
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				 		Undisclosed	Undisclosed	Undisclosed	Undisclosed	Undisclosed	Undisclosed		
						Undisclosed	Undisclosed	Undisclosed			Undisclosed		
													
<div><div>Core Business</div><div> Partnership or supplier deal</div><div> Investment</div><div> Acquisition</div><div> Parent / Subsidiary</div><div> Update</div><div> Partner outside Europe</div></div>													











Layer 1		Layer 2		Layer 3		Layer 4		Layer 5							
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions		Hub, Maintenance, Service, Administrative		AD Fleet Control Center		Mobility Platform & Passenger App		Cloud, V2X, others	
Sensors	Chips, SoC, ECU, DCU, ...	Virtual Driver	Simulation, V&V, ...	AD Vehicle	Components	Cabin Monitoring, Vehicle Control & Remote Assistance Functions	Hub Operations, Maintenance, Service, Administrative	Fleet Control Center & Remote Assistance UI	Mobility Platform, MaaS Intelligence, Rider Experience	3rd party Maps	Cloud	V2X & others			
Undisclosed		  		Renault Group		Undisclosed	Undisclosed	Undisclosed	Undisclosed	Undisclosed	Undisclosed	Undisclosed			
  	   		 	  		 	Executed by public transport partners	  	  	Undisclosed					
  				  			 	  	 						
Core Business		Partnership or supplier deal		Investment		Acquisition		Parent / Subsidiary		Update		Partner outside Europe			



Layer 1				Layer 2				Layer 3		Layer 4	Layer 5																
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others																	
Sensors	Chips, SoC, ECU, DCU, ...	Virtual Driver	Simulation, V&V, ...	AD Vehicle	Components	Cabin Monitoring, Vehicle Control & Remote Assistance Functions	Hub Operations, Maintenance, Service, Administrative	Fleet Control Center & Remote Assistance UI	Mobility Platform, MaaS Intelligence, Rider Experience	3 <sup>rd</sup> party Maps	Cloud	V2X & others															
						Undisclosed						Undisclosed															
				Otokar		Undisclosed		Undisclosed	Undisclosed	Undisclosed		Undisclosed															
							Undisclosed	 																			
Core Business					Partnership or supplier deal				Investment				Acquisition				Parent / Subsidiary				Update				Partner outside Europe		



Layer 1				Layer 2			Layer 3		Layer 4	Layer 5		
HW-Stack Chips / SoC / ECU		SW-Stack Virtual Driver		AD Vehicle		ADS & AD Vehicle Operations Functions	Hub, Maintenance, Service, Administrative	AD Fleet Control Center	Mobility Platform & Passenger App	Cloud, V2X, others		
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 Waymo No further announcements  Luminar	 NVIDIA	 Waymo No further announcements  Didi		 Volvo		Apex.AI •	Undisclosed	Undisclosed	Uber •	 TomTom  NavInfo		



## At a glance



Of all the European OEMs in the AD MaaS space, the **partnership of VWCV, ADMT, and MOIA** is the most ambitious and advanced one. The **ID. Buzz AD prototype vehicles with integrated Mobileye Drive ADS** are **hitting the roads in Germany and the US** – first closed user group testing is expected to start in '25.



Benteler established **HOLON as its new AD business unit**, working closely with SDS supplier Mobileye, fleet operator Beep to develop autonomous shuttles services based on HOLON's mover. As a non-OEM, bringing the vehicle to series production will be challenging – but SPVs will be a USP in the AD space.



Oxa is **one of the few remaining autonomous technology provider in Europe**. First roboshuttle deployments in the US have been accomplished. We believe, Oxa fleets will soon at least hit the roads in the UK after the government's Automated Vehicles Act became law by May 2024.



Verne creates an AV ecosystem consisting of three pillars: an **autonomous electric vehicle** for ride hailing, specialized **infrastructure**, and a mobility **service platform**. The goal is to reshape future mobility and create a unique user experience. Let's see if they will make it to industrialize their solution.

## Latest news

Operating Area for Autonomous Driving.

(08.11.2024)

[Update](#)
[Read](#)

HOLON to establish autonomous shuttle manufacturing facility in Jacksonville, Florida, pioneering the future of mobility in the US.

(04.09.2024)

[Read](#)

Google-backed Oxa rolls out self-driving Ford vans.

(29.10.2024)

[Update](#)
[Read](#)

Verne: Journey to the future of mobility.

(26.06.2024)

[Read](#)

## L4 target

**2026**

**2026**

Not announced

**2026**



## At a glance



**Schaeffler joined forces with VDL** to build shuttles based on its rolling chassis and VDL's expertise in vehicle bodies. The shuttle will be **powered by Mobileye's SDS** while first road tests are to be expected earliest 2025. Now it's essential to bag first partnerships with fleet operators and PTAs.



MOTOR Ai develops a **full-stack software solution for L4, relying on raw sensor data**. The SW stack aims to be **SOTIF compliant and meet AFGBV regulations**. The company also **developed a retrofittable Drive-by-Wire system**. We look forward to seeing the first vehicles on public roads and if the ambitious timeline can be met.



Renault teamed up with Waymo on autonomous driving back in 2019 – no further announcements yet. Also, **Renault is partnering with WeRide on self-driving public transit** in France. A first pilot is about to be implemented by 2024.



EasyMile has been deployed vehicles >30 countries and >300 locations. the **EZ10 is the most widely used autonomous shuttle**. **ODD and SDS capabilities must be enhanced** to remain competitive in autonomous MaaS. However, EasyMile also provides driverless goods transportation solutions.

## Latest news

Schaeffler and VDL Groep to team up on self-driving shuttles.

(31.08.2023)

[Read](#)

There is currently no broad news coverage or communications initiatives. Please check the LinkedIn channel for recent updates.

[Read](#)

Renault Joins Forces with WeRide for Low-Carbon Public Transit Practice in Europe.

(15.05.2024)

[Read](#)

MicroSys and EasyMile collaborate on the development of safety-critical technology for autonomous driving.

(02.04.2024)

[Read](#)

## L4 target

Not announced

**2025**

Not announced

**L4 permission on one public road in France.**



## At a glance



**Navya Mobility's (ex-GAMA)** focus is SDS development, vehicle implementation and operation. As the technology is limited to **fixed routes** and **low speed applications**, it will be quite challenging to compete with more mature AV players. Gated areas seem to be the only promising use case in the future.



MAN has not yet made an appearance in the bus segment in the context of autonomous driving. The **MINGA** project, in which MAN has a **strong partner at its side in SDS provider Mobileye**, is the first step. We see great added value in automated city buses and are excited about the project.



Imagry's technology relies on **multiple 360° cameras** and is based on a **deep neural network** that learns to drive by imitating human behavior. Imagry is quite present on European conferences. Therefore, we are eagerly awaiting first bus deployments in Europe.



The Estonian startup offers autonomous and sustainable last-mile solution and claims to develop the **first autonomous hydrogen vehicle** in the world. Although there are already pilot projects, it will be tough to prevail against the well-known shuttle providers.

## Latest news

Gaussin-Macnica-Mobility becomes Navya Mobility.  
(09.08.2024)

[Read](#)

MAN Truck & Bus to make city buses autonomous with Mobileye.  
(17.05.2023)

[Read](#)

Imagry unveils safe Driver Overwatch™, an autonomous safety feature for young and elderly drivers, at CES 2024.  
(09.01.2024)

[Read](#)

Auve Tech extends reach to U.S. market & enhances strategic partnership with Guident Ltd.  
(05.04.2024)

[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced



### At a glance



There is **no clear strategy in the AD MaaS case**. Volvo has committed to **develop robotaxis with Waymo** - nothing has happened since.

### Latest news

Volvo Cars to debut autonomous driving Ride Pilot feature in California.

(06.01.2022)

[Read](#)

### L4 target

Not announced










# Privately Owned Vehicles.

Intro | Use Cases & Layer Description



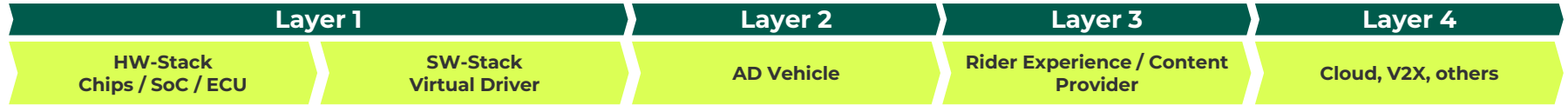


# Privately Owned Vehicles | Use Cases

			 <b>Private Ground</b>	 <b>Highway</b>	 <b>Urban</b>	 <b>Suburban</b>	 <b>Rural</b>
			Airport, factories, yards, harbors, ...	Highways, freeways, ...	City center, designated streets, ...	Federal highway, residential areas, ...	Rural roads, gravel road, ...
POV	Parking		home yard parking (L4)	-	self parking pilot car park, urban self parking	self parking pilot parking place [e.g., supermarket], self parking	
	Driving		-	pilot (L2+), pilot (L3), chauffeur (L4)	urban navigate on pilot (L2+, L2++, L3), city chauffeur (L4)	commuter pilot (L2+, L2++, L3), chauffeur (L4)	



## POV | Layer Model Description



The **Automated Driving System (ADS)** encompasses SW and HW required to achieve Level 4 autonomy. The HW-Stack involves activities such as hardware development, production, testing, automotive approval, and safety compliance. The SW-Stack focuses on self-driving software development and includes activities such as testing & simulation, ODD (Operational Design Domain) management, SDS licensing, mapping, sensor data processing, E2E integration, and safety compliance.

**AD Vehicles** are considered L4 ready vehicle platforms. This layer centers on the development and design and include tasks such as regulatory compliance, safety management, homologation, logistics, and production.

**Rider Experience** enhances user experience through entertainment and connectivity. Tasks include in-vehicle advertisement, shopping, education, gaming, and multimodal connectivity features. May also be covered by the Mobility Platform provider.

Provides necessary supporting infrastructure. Tasks include V2X infrastructure, 3rd party HD maps, and cloud infrastructure and backend.



# POV | Layer Model Description

Exemplary tasks

Layer 1		Layer 2	Layer 3	Layer 4
HW-Stack Chips / SoC / ECU	SW-Stack Virtual Driver	AD Vehicle	Rider Experience / Content Provider	Cloud, V2X, others
HW Development	SW Development	Design & development	In-vehicle advertisement	V2X
HW Production	Testing & Simulation	Quality assurance	Shopping	3 <sup>rd</sup> party HD maps
Sensor Integration	ODD Management	Redundancy	Education	Cloud Infrastructure
Automotive approval	SDS Licensing	X-by-Wire	Working	...
Sensor testing & approval	SW Testing & Approval	Regulatory compliance	Multimodal connectivity	
Sensor fusion	Mapping	Homologation	Gaming	
Calibration and Integration Support	Verification & Validation	After sales / aftermarket	...	
Safety & Compliance	E2E Integration	Safety management		
...	Sensor Integration and Data Processing	AD requirements		
	Safety & Compliance	Logistics		
	...	Production		
		E2E integration		
		...		

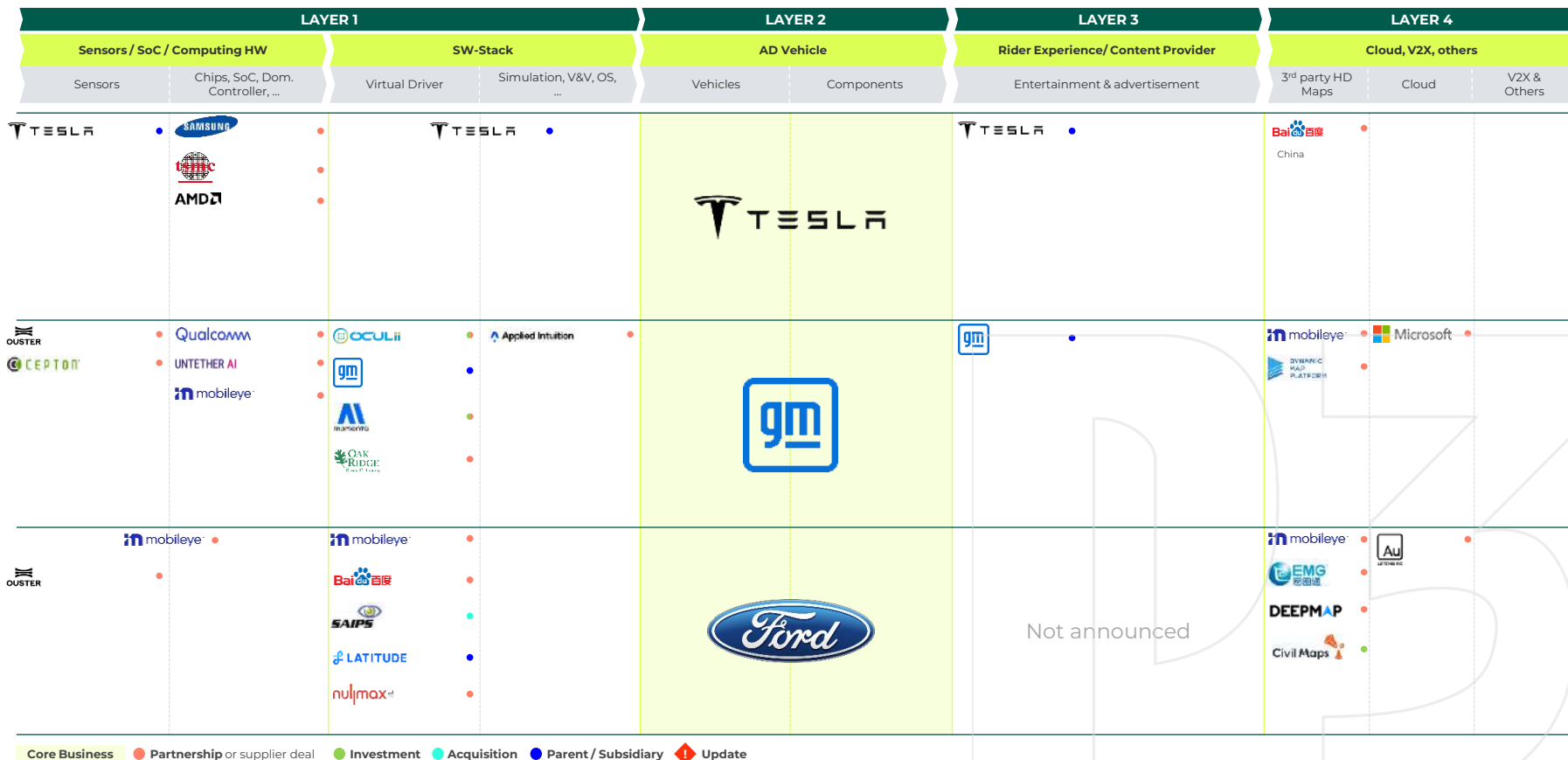


# Privately Owned Vehicles. NAR.

Partnering & Value Chain, Level 4 Target & Latest News











LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
 	 			     		Not announced			
						Not announced	Not announced		
 						Not announced	Not announced		





## At a glance



Tesla **collects a huge amount of data** and build a unique ecosystem around the fleet. While there are still legitimate discussions about the robustness of vision-only approaches, the **performance of FSD in the US is already impressive**. Nevertheless, it is still an L2+ system.



GM has **combined its former Ultra Cruise system** (former goal to achieve hands-free driving for 95 percent of scenarios) **with its Super Cruise program**. May there also be a chance for struggling GM-backed Cruise to power GM vehicles? Also, in **China, GM has invested in Momenta**.



After getting off the robotaxi business with Argo.AI, Ford said **to focus on developing differentiated L2+ and L3 applications** for privately used cars. By 2023, Ford established Latitude to develop future automated driving technology.



Mobileye is the **leading supplier for camera-based driver assistance systems**. In addition to L4 technology for robotaxis, **SuperVision is its state-of-the-art L2+ (eyes on) system**. Also, first **OEMs teamed up with Mobileye to integrate its Chauffeur (eyes off) solution**. We are very much looking forward to testing it on European roads.

## Latest news

US to probe Tesla's 'Full Self-Driving' system after pedestrian killed in low visibility conditions.

(19.10.2024)

[Update](#)
[Read](#)

GM is working on an eyes-off, hands-off driving system.

(04.10.2024)

[Update](#)
[Read](#)

Ford cuts price of BlueCruise hands-free driving feature.

(01.10.2024)

[Update](#)
[Read](#)

Mobileye to end internal Lidar development.

(09.09.2024)

[Read](#)

## L4 target

No binding roadmap for FSD

2025

Not announced

Not announced





## At a glance

helm.ai



Helm.ai employs an AI-first approach to building AD software using an **unsupervised learning technology**. This technology allows to **train on vast volumes of data** without the need for large scale fleets or human annotation. Helm.ai will **power Honda 0 Series** models. Moreover, Helm.ai develops AI-generated video and simulation tools.

Lucid



Lucid's advanced luxury EVs are about to be equipped with its **DreamDrive ADAS systems**, consisting of **up to 32 sensors** and offering **more than 30 driver-assistance features**. Since hardly anything is known about partnerships, the **SW is apparently primarily developed in-house**.

## Latest news

Honda introduces next-generation technologies for Honda 0 Series models at Honda 0 Tech Meeting 2024.

(09.10.2024)

[Update](#)[Read](#)

Driving on Air: Lucid Group builds intelligent EVs on NVIDIA DRIVE.

(22.03.2022)

[Read](#)

## L4 target

Not announced

Not announced



# Privately Owned Vehicles. Asia.

Partnering & Value Chain, Level 4 Target & Latest News







LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience / Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
						Not announced			





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
robosense Baidu 百度 apollo 地平线 华为 HUAWEI	NVIDIA 地平线 Horizon Robotics HUAWEI	Baidu 百度 apollo nuli max HUAWEI		BYD		Not announced	高德地图 amap.com		HUAWEI
ibeo robosense HESAI	mobileye Qualcomm 芯驰 SemiDrive Horizon Robotics NVIDIA	mobileye HAO MO.AI EOCULI Liang Dao nuli max To be confirmed		GWM		Not announced	NAVINFO		HUAWEI 中国移动 China Mobile
robosense HUAWEI Baidu 百度 apollo arbe	BOSCH Baidu 百度 apollo	DiDi pony ! HUAWEI Baidu 百度 apollo		ARCFOX BAIC		Not announced	EMG 华为 HUAWEI		中国移动 China Mobile
Core Business ● Partnership or supplier deal ● Investment ● Acquisition ● Parent / Subsidiary ◆ Update									





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
LUMINAR mobileye robosense ZF ZUSSEN	SemiDrive Qualcomm TTTech Horizon Robotics NVIDIA	momenta nuro		SAIC		Not announced	mobileye here		ZTE
robosense	NVIDIA Qualcomm	momenta		SAIC		Not announced			Alibaba.com
HESAI BOSCH OFILM 欧菲光	NVIDIA Horizon Robotics 德赛西威	Li Auto 轻舟智航 OCRAFT		Li Auto		Not announced	高德地图 amap.com		
Core Business Partnership or supplier deal Investment Acquisition Parent / Subsidiary Update									





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience / Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
HESAI HUAWEI SenseAuto	HUAWEI Horizon Robotics NVIDIA SenseAuto WNDVR	MINIEYE SenseAuto	BlackBerry HUAWEI	NETA HUAWEI		Not announced	HUAWEI	HUAWEI	HUAWEI
GUHAO HESAI Zong Y MU OFILM 欧菲光 舜宇智能光学	辉美智能 RHINO NVIDIA	MI GUHAO Dass'Vision Zong Y MU		千麟科技 MI		Not announced	Zong Y MU Baidu		
HESAI	NVIDIA	nuli max	BlackBerry	HUAWEI HiPhi		Not announced	HUAWEI	HUAWEI	HUAWEI





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
<div>robosense</div> <div></div>	<div> 寒武纪科技</div> <div></div> <div> 黑芝麻</div> <div></div> <div></div> <div></div>	<div> 百度</div> <div></div> <div></div> <div></div>		<div></div> <div>FAW GROUP</div> <div></div>		Not announced			
<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div> <div></div> <div></div>	<div> 百度</div> <div></div> <div></div> <div></div> <div></div> <div></div>		<div></div> <div></div> <div>CHERY</div> <div></div>	<div></div>		<div></div> <div></div> <div>BOE</div>		
<div>robosense</div> <div></div>	<div></div> <div></div>	<div></div> <div></div> <div></div> <div></div>		<div></div> <div></div>		Not announced		<div></div> <div></div>	
<div>Core Business</div> <div> Partnership or supplier deal</div> <div> Investment</div> <div> Acquisition</div> <div> Parent / Subsidiary</div> <div> Update</div>									











































LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience / Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
HESAI BOSCH	Horizon Robotics	百度	HUAWEI	长安汽车 CHANGAN 吉利汽车	HUAWEI	HUAWEI	百度		
	BLACK SESAME 蔚来 东风日产 Phicent	百度 东风日产 Phicent		DONGFENG DONGFENG MOTOR CORPORATION	HUAWEI	Not announced	HUAWEI Tencent 腾讯		
DESAY SV OFILM 欧菲光 小马智行	NVIDIA	百度		GEELY		Not announced	百度		
Core Business		Partnership or supplier deal	Investment	Acquisition	Parent / Subsidiary	Update			





LAYER 1		LAYER 2		LAYER 3		LAYER 4			
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
				      		Not announced			
									
	     			     		Not announced			
  	  			 		Not announced			
<div>Core Business</div> <div><div></div> Partnership or supplier deal</div> <div><div></div> Investment</div> <div><div></div> Acquisition</div> <div><div></div> Parent / Subsidiary</div> <div><div></div> Update</div>									





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
OUSTER Valeo in mobileye	RENESAS in mobileye Qualcomm	autotx cruise helm.ai		HONDA		SONY	DYNAMIC RAD PLATFORM Baidu    apollo		
robosense	Qualcomm EXYNOS	HAOMO.AI		GWM		Not announced	NAVINFO		
BOSCH robosense HUAWEI	NVIDIA Qualcomm HUAWEI Antares	momenta		NIO TOYOTA 东风日产 DWD GAC AKINOR	ESAC !	Not announced	Tencent 腾讯 aws		
Core Business		Partnership or supplier deal		Investment		Acquisition		Parent / Subsidiary	





LAYER 1		LAYER 2		LAYER 3		LAYER 4				
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider		Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement		3rd party HD Maps	Cloud	V2X & Others
<div>robosense</div> <div>Ambarella</div>		<div>LOTUS</div> <div>ROBOTICS</div>		<div>LOTUS</div> <div>GEELY</div> <div>LYNK&amp;CO</div>		Not announced			<div>LOTUS</div> <div>ROBOTICS</div>	
<div>BOSCH</div> <div>HESAI</div> <div>robosense</div>	<div>NVIDIA</div> <div>Horizon Robotics</div>	<div>WeRide</div> <div>文远知行</div>		<div>CHERY</div> <div>EXEED</div>		Not announced		<div>Tencent 腾讯</div>	<div>Tencent 腾讯</div>	
<div>LUMINAR</div> <div>HESAI</div> <div>robosense</div> <div>pony.ai (Sensor fusion)</div>	<div>NVIDIA</div> <div>Horizon Robotics</div> <div>pony.ai</div>	<div>pony.ai</div>		Not announced		Not announced		<div>NAVINFO</div>		
Core Business Partnership or supplier deal Investment Acquisition Parent / Subsidiary Update										





	LAYER 1				LAYER 2		LAYER 3	LAYER 4		
	Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
	Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
NEW							Not announced			
							Not announced			
Moved from MaaS							Not announced			





## At a glance

NIO



While NIO premium EVs are **hitting several markets outside China**, ADAS capabilities and functions of other competitors in China seem to be slightly more advanced and widely available.

XPENG



XPENG announced that its XNGP urban intelligent driving system has achieved **100% HD map-free operation** with the goal to achieve full coverage of XNGP functions in major urban road networks across China by the end of 2024.

ZEEKR



Geely's EV brand develops the SPV robotaxi for Waymo while **Mobileye's SuperVision system for privately owned vehicles** was announced. However, this cooperation seems to struggle as Zeekr unveiled **Haohan 2.0 Plus, its proprietary end-to-end intelligent driving architecture**, building on a multimodal large language model.

BYD



In December 2021, **BYD and Momena**, one of China's major SDS developers, formed a **joint venture for autonomous driving**. To date, ADAS functionalities and availability lag behind other competitors in China.

## Latest news

NIO said to revamp intelligent driving R&D division, focusing on end-to-end large models.

(20.06.2024)

[Read](#)

XPENG P7+ model comes standard with Tianji XOS 5.4 system.

(25.10.2024)

[Update](#)
[Read](#)

ZEEKR launches Haohan 2.0 Plus end-to-end smart driving architecture at Auto Guangzhou 2024.

(15.11.2024)

[Update](#)
[Read](#)

BYD FANGCHENGBAO's vehicles to adopt Huawei's smart driving tech.

(27.08.2024)

[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced





## At a glance



GWM aims to provide complete mobility ecosystems with dedicated brands for the European markets. **Regarding AD**, GWM has been working with companies such as **Mobileye, Qualcomm** or **Nullmax**. By end of 2024, GWM **announced the roll out of its all-scenario HD map-free NOA** functions nationwide



While BAIC teamed up with Baidu to develop robotaxis, its EV brand **Arcfox models are equipped with Huawei software and sensor suite**. Our regular ADAS benchmark drives in China showed: **Huawei system's performance is stunning**.



China's largest carmaker intends to equip premium electric vehicle models with **Momenta-developed intelligent driving technology**. SAIC may not seem as 'fancy' in its outward appearance as some startups from China – that's why they co-founded IM Motors in a JV with Alibaba.



IM Motors, **co-founded by SAIC Motor, Zhangjiang Hi-Tech, and Alibaba** pushes its AD capabilities through **joint development with Momenta**. While urban NOA was implemented swiftly, IM also obtained the official AV testing license for highway/expressway in Shanghai for L3 testing.

## Latest news

Great Wall Motor rolls out all-scenario HD map-free NOA functions nationwide.

(19.11.2024)

[Update](#)
[Read](#)

BAIC Group announces \$70.35 million investment in Pony.ai.

(02.12.2024)

[Update](#)
[Read](#)

SAIC Motor, ZTE co-launch vehicle communication module platform.

(21.08.2024)

[Read](#)

IM Motors, NVIDIA, Momenta to co-pioneer DRIVE AGX Thor chip in mass-produced intelligent driving systems.

(18.11.2024)

[Update](#)
[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced





## At a glance

## Latest news

## L4 target

Li Auto



Li Auto is another EV company aiming for autonomous driving. While Li **claims** their **technology will soon be competitive with Tesla's Autopilot**, they have **yet to prove those capabilities**. Competition in China is strong.

Li Auto rolls out 'end-to-end + VLM' smart driving system via OTA.

(23.10.2024)

Update

Read

Not announced

NETA



NETA Auto, a Hozon Auto brand, is one of several Chinese OEMs that has entered into **in-depth cooperation with Huawei**. Furthermore, teaming of with Hesai for future vehicle models shall further enhance automated driving capabilities.

Wind River powers NETA Auto's intelligent controller.

(19.07.2024)

Read

Not announced

mi



Xiaomi sets sight on several autonomous electric vehicle brands by **substantially investing in smart car technology**. The unveiled **Xiaomi SU7 offers great user experience at lower cost** than Western OEMs – the ADAS has still some weaknesses but is about to catch up with competition.

Xiaomi SU7 to roll out urban NOA feature in ten cities.

(31.05.2024)

Read

Not announced

HiPhi



HiPhi, a **brand of Human Horizons** is developing the '**HiPhi Pilot**', providing redundant and safe intelligent driving features aiming at both L3 and L4. At this point, too little is known about the AD capabilities to seriously assess the company. **Meanwhile, the company seems to face bankruptcy**.

Human Horizons, Huawei Cloud partner on dedicated intelligent driving cloud.

(25.07.2023)

Read

Not announced





## At a glance



FAW Group established several **partnerships along the AD ecosystem – tech providers such as DJI or Mobileye** are about to integrate their smart driving solutions into FAW Group's vehicles, usually starting with FAW's Hongqi brand.



Through **various partnerships**, the company is driving the development of intelligent vehicles. **Chery plans to offer L4-capable vehicles in 2025**. Not much time left. Partnerships with iMotion, Nullmax or dji could boost the development.



GAC is the fifth largest car manufacturer in China and sells its vehicles under various brands. The company has always **worked closely with Huawei** and plans to produce L4 vehicles under its own AION brand from 2024 as a manufacturing partner of Huawei.



CHANGAN is **working closely with Huawei on Level 4 Autopilot**, 5G, and C-V2X, and plans to offer **L4 capabilities in 2025**. Recently, the company announced a strategic cooperation with Geely, among others, to combine strengths and share resources in the development of autonomous cars.

## Latest news

FAW Group partners with DJI Automotive for intelligent driving tech development.

(19.04.2024)

[Read](#)

Horizon Robotics, Chery advance collaboration on Journey 6 smart computing platform.

(20.09.2024)

[Read](#)

RoboSense secures new contracts for LiDAR supply from GAC AION.

(24.10.2024)

[Update](#)
[Read](#)

Bosch delivers 3rd-gen multipurpose camera to Changan DEEPAL G318.

(28.05.2024)

[Read](#)

## L4 target

Beyond **2025**

**2025**

Not announced

**2025**





## At a glance



Dongfeng's **VOYAH brand vehicles** are about to be equipped with **Baidu's intelligent driving system**, offering features like Navigation on Autopilot. By end of 2024, **Dongfeng Nissan teamed up with Momena**, while Dongfeng's **VOYAH announced a partnership with PhiGent Robotics**



JI YUE is a joint venture between Geely and Baidu. The first production model relies on solely visual perception algorithms and thus a **pure vision approach**. The company intends to cover 200 cities nationwide with its advanced urban intelligent driving functions by end of 2024.



During our benchmark drives in China, **Huawei's ADS 2.0 performance was stunning**. ADS 3.0 is about to be unveiled by the end of 2024 and promises another leap in performance. Also, the solution has been integrated in different EV models. Huawei had the goal to become China's Bosch – towards **SW capabilities, it's already much more advanced in China**.



Nullmax pursues a '**Machine Learning First**' approach and has **teamed up with several OEMs, chip suppliers and other companies**. While the depth of cooperation is often unclear, you should keep an eye on Nullmax and its **vision-based, multi-sensor fusion and perception technology** route.

## Latest news

Dongfeng Nissan partners with Momena to launch advanced intelligent driving solutions.

(18.11.2024)

[Update](#)
[Read](#)

JI YUE 07 commences pre-sales at 215,900 yuan, featuring Baidu's Apollo Self Driving tech.

(29.08.2024)

[Read](#)

AITO rolls out HD map-free NCA smart driving function nationwide.

(20.03.2024)

[Read](#)

Nullmax, Black Sesame Technologies co-developed smart driving features complete onboard deployment.

(27.09.2024)

[Update](#)
[Read](#)

## L4 target

Not announced

Not announced

**2025**

Not announced





## At a glance



Initially, QCraft held a permit to test robobuses in Beijing and has been operating a small robotaxi fleet. However, the company is meanwhile **focusing on L2++ instead of L4 robotaxis** and teamed up with Li Auto, for instance. Moreover, Qcraft pursues a **gradual evolution from L2++ to L4** autonomous driving.



While providing its own "SENSING" ADAS, Honda has attracted attention primarily through **investing in GM's Cruise for MaaS initiatives**. An **investment in Helm.ai**, however, is intended to benefit the company's own software and AI competencies. Honda 0 Series models will be powered by Helm.ai.



Haomo.ai is **backed by GWM** and develops its urban navigation-assisted Hpilot for mass-production. By Feb 2024, it has been **integrated in over 20 vehicle models**, achieving >120 mn km of assisted driving. Gathering a huge amount of data may be beneficial towards L4 development.



While still running a small robotaxi fleet, Momena shifted **focus is on advanced L2+ solutions for OEMs** in all key markets. Momena **teamed up with several automakers** including Mercedes, GAC AION and IM Motors to develop and roll out end-to-end intelligent driving large model driving solutions.

## Latest news

QCraft closes Series C+ financing round.

(28.10.2024)

[Update](#)
[Read](#)

Honda introduces next-generation technologies for Honda 0 Series models at Honda 0 Tech Meeting 2024.

(09.10.2024)

[Update](#)
[Read](#)

Haomo.ai nabs 300 million yuan in Series B2 financing round.

(23.04.2024)

[Read](#)

IM Motors, NVIDIA, Momena to co-pioneer DRIVE AGX Thor chip in mass-produced intelligent driving systems.

(18.11.2024)

[Update](#)
[Read](#)

## L4 target

Not announced

2025

Not announced

Not announced





## At a glance

## Latest news

## L4 target

LOTUS  
ROBOTICS

**Lotus Robotics, the intelligent driving arm of Lotus Technology**, provides comprehensive intelligent driving solutions, including advanced platform software, cloud toolchains, and operation solutions. While the company may be relatively unknown in Europe and the USA, its **AD capabilities are seen by local experts as among the best in the Asian market.**

(24.09.2024)

Read

Not announced

WeRide  
文远知行

Apart from L4, WeRide's portfolio also includes **ADAS for passenger vehicles using L2+ and L3**. The company formed a **partnership with Bosch**, combining its SW stack with Bosch's industrialization and engineering capabilities. The first mass-produced vehicle using Bosch & WeRide technology is the Chery Exeed Xlantix ET.

(25.04.2024)

Read

Not announced

pony.ai



Pony.ai offers OEMs & Tier 1 its proprietary **POV solution, "Xiaoma Shitu,"** which supports high-speed and urban NOA. It's available in three configurations: **PonyClassic, PonyPro, and PonyUltra**. PonyClassic is equipped with 6 cameras and 1 millimeter-wave radar, while the advanced PonyUltra version features a setup of 11 cameras, 5 millimeter-wave radars, and 3 LiDAR sensors.

(11.01.2023)

Read

Not announced

Baidu  
百度

Baidu Apollo **provides OEMs and Tier 1s** with an AD platform called **Apollo Pilot**. Its AI-driven solutions focus on scalability and safety, collaborating with global automakers. The first production model of **Baidu's and Geely's joint venture JI YUE** relies on solely visual perception algorithms and thus a pure vision approach.

JI YUE 07 commences pre-sales at 215,900 yuan, featuring Baidu's Apollo Self Driving tech.

(29.08.2024)

Read

Not announced



## At a glance



DeepRoute initially focused on L4 robotaxi and delivery van deployments but **shifted in 2022 to L2+ and L3** technology. In late 2024, it **raised \$100 million** in a Series C1 funding round to **boost R&D in its DeepRoute IO “end-to-end” model**, expand collaborations with global automakers, explore future robotaxi opportunities, and recruit more AI-native talent.



Geely is advancing AD for POVs through **partnerships and in-house development**. It collaborates with companies like Mobileye, integrating these technologies into models from brands like Volvo, and Polestar. Geely's **most renowned EV brand with AD ambitions** is probably **Ji Yue**, a joint venture with Baidu.

## Latest news

DeepRoute.ai secures \$100 million in C1 funding round.

(05.11.2024)

[Read](#)

Foretellix and Geely partner to accelerate AV development.

(07.05..2024)

[Read](#)

## L4 target

2025

Not announced



# Privately Owned Vehicles. Europe.

Partnering & Value Chain, Level 4 Target & Latest News







LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
LUMINAR BOSCH Valeo veoneer	NVIDIA brainchip* Qualcomm	NVIDIA 百度 momenta				Mercedes me ZYNC	DEEPMAP here	腾讯	
INNOVIZ TECHNOLOGIES APTIV MAGNA veoneer Valeo	mobileye Qualcomm	Ariiver Valeo AutoBrains 腾讯 STELLANTIS TATA TECHNOLOGIES	TTTech BlackBerry		Continental S	BMW CONNECTED DRIVE AirConsole	here aws	ottopia	
mobileye INNOVIZ TECHNOLOGIES	NVIDIA Qualcomm CARIAD mobileye	VAIA Safe Mobility Hendrick Automotive UAD INTENTA Horizon Robotics BOSCH	CARIAD BlackBerry Luxoft TTTech Applied Intuition	<b>VOLKSWAGEN GROUP</b>		Not announced	tomtom mobileye here 高德 NIRA	Microsoft HUAWEI	verizon





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
 	  	 		STELLANTIS		Not announced	 		
   		 	 			Not announced			
 	      	    		 		Not announced	 		
<div> <div>Core Business</div> <div>Partnership or supplier deal</div> <div>Investment</div> <div>Acquisition</div> <div>Parent / Subsidiary</div> <div>Update</div> </div>									





LAYER 1				LAYER 2		LAYER 3	LAYER 4		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Rider Experience/ Content Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Entertainment & advertisement	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
<b>BOSCH</b> <b>Webasto</b>	<b>RECOGNI</b> <b>NVIDIA</b> <b>QVOC</b> <b>Ambarella</b> <b>BOSCH</b>	<b>UAD</b> <b>momenta</b> <b>WeRide</b> <b>FIVE AI</b> <b>RECOGNI</b> <b>CARIAD</b> <b>Microsoft</b>			<b>BOSCH</b> <b>next</b>	Not announced	<b>tomtom</b> <b>DEEPMAP</b> <b>here</b> <b>atlatic</b>	<b>Microsoft</b>	
<b>LUMINAR</b>	<b>mobileye</b> <b>NVIDIA</b>	<b>mobileye</b>		<b>GEELY</b> <b>polestar</b>		<b>polestar</b> <b>Google</b>	<b>Google</b>		
	<b>NVIDIA</b>	<b>WAYVE</b>		<b>JAGUAR</b> <b>Uber</b> <p>The two companies collaborate with OEMs to use Wayve's AI. Long-term target to integrate Wayve-powered AVs on the Uber network.</p>		Not announced		<b>Microsoft</b>	





## At a glance



**Drive Pilot is the world's first ADAS to gain type approval for a L3 system** and available in Europe and the US. Initially, the supported speed was limited to 60 km/h. In 2024, an upgrade was announced, enabling the system to follow a vehicle on the motorway at up to 95 km/h.



BMW seems to have greatly **reduced its own activities with regard to L3 and L4** and **instead focuses on partnerships** - most recently with Stellantis and Tata. In our regular ADAS benchmark drives, BMW's driver assistance systems show the strongest performance among all European OEMs.



**CARIAD is primarily responsible for software development** in the **private ownership** segment. There is also a development partnership (Automated Driving Alliance) with Bosch. We are watching the development of CARIAD and are curious to see whether they can live up to their great task.



Stellantis is working on **L3 and L4 solutions with technology partners** - especially **BMW and Waymo**. In 2023, Stellantis launched its L2 hands-free driver assistance system, which will be integrated into the 2024 Jeep Grand Cherokee.

## Latest news

Support speed of up to 95 km/h on German motorways..

(23.09.2024)

[Read](#)

BMW Group and Tata Technologies aim to collaborate for the development of Automotive Software and Business IT solutions.

(02.04.2024)

[Read](#)

Volkswagen Group intensifies collaboration with Mobileye.

(20.03.2024)

[Read](#)

Stellantis boosts LiDAR technology.

(20.03.2024)

[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced





## At a glance

• APTIV •



Aptiv is a leading company in the development of ADAS for and invested a huge amount of money in Motional, a JV with Hyundai, before reducing its common equity interest from 50% to about 15% by end of March 2024.

**Aptiv has acquired or at least invested in software companies to strengthen in-house capabilities** towards ADAS and AD.

Continental



Continental **spun off its own AD unit**. Traditional Tier 1 such as Conti compete with strong SW players as OEMs/ customers increasingly purchase HW and SW separately. However, partnerships and investments in AI companies show that Conti **is willing to keep up the race**.

BOSCH



Bosch **teamed up with CARIAD** to jointly develop automated driving functions and acquired AV company Five AI a couple of years ago to strengthen its AD capabilities. Traditional Tier 1 such as Bosch **compete with strong SW players** as OEMs/ customers increasingly purchase HW and SW separately



Polestar is a renowned EV player in the EU market. While ADAS of both Polestar 1 and 2 can't compete with many competitors, there is supposed to be a **significant leap with Polestar 3 and 4**. With **NVIDIA, Luminar and especially Mobileye**, they have strong technology partners at their side.

## Latest news

Horizon Robotics, Aptiv join forces to develop localized intelligent driving solutions.

(03.07.2023)

[Read](#)

NOVOSENSE teams up with Continental to develop automotive pressure sensor chips.

(28.10.2024)

[Update](#)
[Read](#)

For safer roads: Bosch teams up with Microsoft to explore new frontiers with generative AI.

(28.02.2024)

[Read](#)

Polestar 4 to integrate Luminar LiDAR with Mobileye Chauffeur.

(09.11.2023)

[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced



## At a glance



Wayve does **not rely on HD maps** and **hand-coded rules** but **focuses on its deep and self-learning AI technology** based on cameras. The company raised \$1bn in 2024 to take its Tesla-like technology for self-driving to many carmakers. This approach is different compared to companies like Tesla.

## Latest news

Wayve launches in the US with San Francisco testing program and new office.

(23.10.2024)

Update

Read

## L4 target

Not announced













# Goods Transport & TaaS.





Intro | Use Cases, Market Insights & Layer Description






















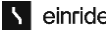







































# Goods Transport & TaaS | Use Cases

							
			<b>Gated Area</b>	<b>Highway</b>	<b>Urban</b>	<b>Suburban</b>	<b>Rural</b>
			Airport, factories, yards, harbors, ...	Highways, freeways, ...	City center, designated streets, ...	Federal highway, residential areas, ...	Rural roads, gravel road, ...
<b>Transport</b>	<b>S</b>		last mile delivery	-	last mile delivery	last mile delivery	last mile delivery
	<b>ML</b>		automated yards, e.g., intralogistics trucks (L4)	-	hub-and-spoke robo transporter	hub-and-spoke robo transporter	robo transporter
	<b>XL</b>		automated yards, e.g., intralogistics trucks (L4)	hub-to-hub self-driving truck	-	-	-
<b>Platooning</b>			automated yards, e.g., intralogistics trucks (L4)	hub-to-hub self-driving truck	-	-	-
<b>Offroad</b>			e. g. snow clearing (L4), rob harvesters	-	e. g., street sweeping machines (L4)	e. g., street sweeping machines (L4)	e.g., robo tractor

<b>Automated Yards</b>	<b>Hub-to-Hub</b>	<b>Hub-and-Spoke</b>	<b>Robo Transporter</b>
 <p>Transportation within gated areas, yards, hub or similar confined areas</p>	 <p><b>Hub-to-hub</b> transportation between logistic hubs incl. drayage run</p>	 <p><b>Hub-and-spoke</b> transportation from a hub to different spokes incl. drayage runs</p>	 <p><b>Robotransporter</b> Free float autonomous transport vehicles &amp; other use cases such as shuttles</p>



# Goods Transport & TaaS | Longlist

											
											
Transport	S										
	ML	 				 				 	
	XL	 	 	 	 	 	 	 	 		 
Platooning					 			 	 		 
Offroad					 				 		 

 Activities 
  No activities 
  Stopped activities 
  G=Gated Area 
  P=Public Area



## Goods Transport &amp; TaaS | Longlist

Transport	S				P 			P 			
	ML	P 		P 		P 		P 			
	XL		P 		P 	P 	P 	P 	P 	P 	P 
Platooning					P 	P 	P 				
Offroad											

Activities

No activities

Stopped activities

G=Gated Area

P=Public Area



# Goods Transport & TaaS | Longlist

		STARSHIP	AVRIDE	TORC	MARS	SAIC	NEOLIX	HYUNDAI MOTOR GROUP	DAF	CRUISE	阿里巴巴 Alibaba.com
Transport	S	G/P 	P 					P 			
	ML						P 			P 	G/P 
	XL			P 	P 	G/P 					P Da Man Lv - No picture available yet
Platooning								P 	P 		
Offroad											

Activities

No activities

Stopped activities

G=Gated Area

P=Public Area



# Goods Transport & TaaS | Longlist

Transport	S								P 		P 
	ML		P 	P 			P 	P 		P 	
	XL	G 			G 	P 					
Platooning											
Offroad			G/P 				P 				

Activities

No activities

Stopped activities

G=Gated Area

P=Public Area



## Goods Transport &amp; TaaS | Longlist

Transport	S		P 	P 			P 				
	ML				P 	P 		P 			
	XL								P 	P 	P 
Platooning											
Offroad		P 									

Activities

No activities

Stopped activities

G=Gated Area

P=Public Area



Goods Transport & TaaS | Longlist

			CLEVON	driveblocks		LOXO	Goggo network		tinymile		NEUBILITY
Transport	S	P 	P 						P 	P 	P 
	ML					P 	P 				
	XL			P 	P 			P 			
Platooning											
Offroad				G 							
		<div><div></div>Activities</div> <div><div></div>No activities</div> <div><div></div>Stopped activities</div> <div>G=Gated Area</div> <div>P=Public Area</div>									



Goods Transport & TaaS | Longlist

									NEW
						TIER IV			
Transport	S								
	ML		P 	P 	P 				
	XL	P 				P 	P 	P 	
Platooning									
Offroad									

Activities

No activities

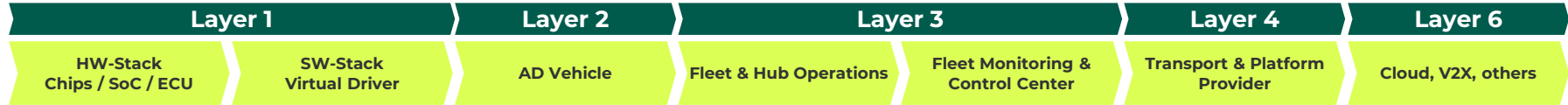
Stopped activities

G=Gated Area

P=Public Area



## Goods Transport & TaaS | Layer Model Description



### The **Automated Driving System (ADS)**

encompasses SW and HW required to achieve Level 4 autonomy.

The HW-Stack involves activities such as hardware development, production, testing, automotive approval, and safety compliance.

The SW-Stack focuses on self-driving software development and includes activities such as testing & simulation, ODD (Operational Design Domain) management, SDS licensing, mapping, sensor data processing, E2E integration, and safety compliance.

### **AD Vehicles**

are considered L4 ready vehicle & truck platforms. This layer centers on the development and design and include tasks such as regulatory compliance, safety management, homologation, logistics, production, and provision of TaaS and remote operations functions and components.

### **Fleet Operations**

covers operational activities for AV fleets. Tasks include hub setup, financing, concessions, charging, maintenance, training, cleaning or parts supply.

Moreover, Fleet Monitoring & Control Center tasks include goods and vehicle monitoring, remote vehicle control, departure checks, and remote assistance.

### **Transport providers**

(i.e., carriers) carry goods from shippers (e.g., grocery stores) to B2B or B2C customers using autonomous vehicles.

Freight matching may be executed by

### **Platform providers**

that connect shippers and carriers or transport demand and supply. They are responsible for order management or disposition planning based on data analysis and simulation.

Provides necessary supporting infrastructure. Tasks include V2X infrastructure, 3rd party HD maps, and cloud infrastructure and backend.



# Goods Transport & TaaS | Layer Model Description

Exemplary tasks

Layer 1		Layer 2	Layer 3		Layer 4	Layer 6
HW-Stack Chips / SoC / ECU	SW-Stack Virtual Driver	AD Vehicle	Fleet & Hub Operations	Fleet Monitoring & Control Center	Transport & Platform Provider	Cloud, V2X, others
HW Development	SW Development	Design & development	Hub Setup	Execution of ADS & AD Vehicle Operations Functions (e.g., remote assistance) in UI	Logistics platform	V2X
HW Production	Testing & Simulation	Quality assurance	Financing / Insurance	AD Vehicle Real-Time Tracking and Monitoring	Booking	3rd party HD maps
Sensor Integration	ODD Management	Redundancy	Concessions	Incident Management	Pricing	Cloud Infrastructure
Automotive approval	SDS Licensing	X-by-Wire	Charging	AD vehicle Maintenance Scheduling	Payment	
Sensor testing & approval	SW Testing & Approval	Regulatory compliance	Maintenance & Service	AD Vehicle Charging Scheduling	Disposition planning	
Sensor fusion	Mapping	Homologation	Washing & Cleaning	Emergency Response Coordination	Fleet Intelligence (e.g., fleet & load optimization)	
Calibration and Integration Support	Verification & Validation	After sales / aftermarket	Training	AD Vehicle Mission Dispatch	Order management	
Safety & Compliance	E2E Integration	Safety management	In/De-fleeting	Safety Driver Management	API / Integration	
...	Sensor Integration and Data Processing	AD requirements	Parts supply	Data Analytics and Reporting	Customer support	...
	Safety & Compliance	Logistics	...	Customer interaction	Customer authentication (delivery services)	
		Production			Data Analytics	
		TaaS/Logistics Functions (e.g., for remote assistance)			E2E Integration	
		E2E integration				
		...				















































# Goods Transport & TaaS. NAR.

Partnering & Value Chain, Level 4 Target & Latest News



























































# Goods Transport & TaaS NAR

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider		Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport		3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
 WAYMO	 	 WAYMO	 LATENT LOGIC	 JAGUAR	Note: trucking will not be considered here anymore	 AutoNation	 WAYMO	 Uber Freight	Not announced			
 LUMINAR	 Aeva	 TORC	 TNO Innovation for life	 FREIGHTLINER		 PENSKE		 SCHNEIDER	 aws			
 Plus	 NVIDIA	 Plus	 BlackBerry	 PACCAR	 VELOCITI	 GOODYEAR		 amazon	 Alibaba.com	 Transurban		
 OUSTER			 Applied Intuition		 SCHAEFFLER			 SF EXPRESS	 ZTO 中通快递			
 TELEDYNE FLIR			 ForetelliX		 BOSCH			 DSV	 dm			
 Aeva			 DeepScenario					 WORLDDEX				
 LUMINAR			 algotux		 JAC							
 HYUNDAI												
Core Business	Partnership or supplier deal	Investment	Acquisition	Parent / Subsidiary	Update							

Core Business Partnership or supplier deal Investment Acquisition Parent / Subsidiary Update



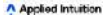

















































# Goods Transport & TaaS NAR

LAYER 1				LAYER 2		LAYER 3		LAYER 4		LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider		Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport		3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
  	 			 	 	    		     	     	Not announced		
				   PORSCHE SE		Not announced		Uber Freight	Not announced			
   	 	 Uber ATG		 				   Uber Freight  				












































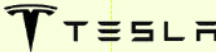







# Goods Transport & TaaS NAR

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider		Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport		3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
				 	 	  		     	 	Not announced		
  	  	   	  				     	  				
 		 				Not announced		   	Not announced			
Core Business		Partnership or supplier deal		Investment		Acquisition		Parent / Subsidiary		Update		


















# Goods Transport & TaaS NAR

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider		Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport		3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
   	 			     		 		         	 			
	Not announced	   		     		Not announced				 		
   		 				Not announced		Not announced		Not announced		
<div><div>Core Business</div><div> Partnership or supplier deal</div><div> Investment</div><div> Acquisition</div><div> Parent / Subsidiary</div><div> Update</div></div>												



# Goods Transport & TaaS NAR

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
 <b>Whale dynamic</b> • Whale Dynamic AV stack consists of 3 <sup>rd</sup> party HW		 <b>Whale dynamic</b> •		 <b>OX</b> •			 <b>zeeba</b> •	 <b>robomart</b>   <b>AVERY DENNISON</b> •	Not announced		
		 <b>KODAK</b> •  <b>TORC</b> •  <b>Gatik</b> •  <b>driveblocks</b> •  <b>EMBARK</b> •  <b>GHOST</b> •  <b>Applied Intuition</b>		 <b>ISUZU</b> • DAIMLER TRUCK • TRATON •  <b>einride</b> •		Not announced		Not announced	Not announced		



# Goods Transport & TaaS NAR

## At a glance



The Waymo Driver has **over a decade of deep AD experience** including **millions of miles on public roads** and **billions of miles in simulation**. Waymo has **reduced trucking efforts to a minimum** in order to focus on the ride hailing case. Also, the existing fleet is used for food delivery via Uber Eats,



Torc is an independent **subsidiary of Daimler Truck AG** and the **first AV company to enter an integrated partnership** with a **truck OEM**. Torc and DT are ramping up development and testing in the US. Go-to-market is targeted for 2027.



PlusDrive follows an **evolutionary path from L2++ to L4**. **Global initiatives in cooperation with IVECO, TRATON Group, and Hyundai have been announced**. In contrast to competitors, Plus is already testing its self-driving and highly automated trucks on European roads.



Kodiak Robotics develops autonomous technology for long-haul trucking and carried the **first commercial freight just eight months after being founded**. After long considering Kodiak as an acquisition candidate, they meanwhile became **one of the strongest players in the market**.

## Latest news

Phoenix residents can now experience Uber Eats delivery with the Waymo Driver.

(03.04.2024)

[Read](#)

Torc Robotics performs successful fully autonomous product validation.

(29.10.2024)

[Update](#)
[Read](#)

TRATON Announces Global Release Of Plus SuperDrive.

(30.10.2024)

[Update](#)
[Read](#)

Kodiak selects Wabash's Trailers as a Service to optimize its autonomous fleet.

(23.09.2024)

[Read](#)

## L4 target

Focus on ride hailing and urban delivery with I-PACE fleet

**2027**

**2027**

**2025**



# Goods Transport & TaaS NAR

## At a glance



Toronto-based Waabi is renowned for both its founder and its **closed-loop simulator**, Waabi World, which targets an **AI-first approach**. Waabi has entered promising partnerships with Volvo and Uber Freight. The company is worth observing.



Instead of deploying robotaxis, Aurora is **focusing primarily on TaaS** and has already entered into truck **collaborations with PACCAR, Volvo and Continental**. These **collaborations promise to scale their test fleet** to get their product ready for production.



Gatik focuses on **short-haul, B2B logistics** for the **retail industry**. More specifically, hub-and-spoke supply chain operations. The vehicles are restricted to **fixed, repeatable routes**. Gatik has found a niche that no other market player is dedicated to now.



Nuro **has been a pioneer in last-mile deliveries** with a special purpose vehicle. In September 2024, Nuro announced to **start licensing its L4 technology** to manufacturers of personally owned vehicles and mobility providers, like ride-hail and delivery companies. A smart move to monetize its tech end create a viable business case.

## Latest news

Waabi raises \$200M USD to launch fully driverless trucks in 2025.

(18.06.2024)

[Read](#)

Aurora Innovation delays commercial autonomous truck launch to 2025.

(30.10.2024)

[Update](#)
[Read](#)

Gatik secures strategic investment from NIPPON EXPRESS HOLDINGS to expand North American middle-mile logistics.

(21.08.2024)

[Read](#)

Nuro expands driverless autonomous vehicle testing in push to attract customers.

(19.11.2024)

[Update](#)
[Read](#)

## L4 target

2025

2027

L4 target reached in Arkansas by 2021

Not announced



# Goods Transport & TaaS NAR

## At a glance



After Argo's shutdown, it's unclear how Ford will proceed for urban delivery and trucking. Nevertheless, **Ford Otosan is cooperating with AVL** in this area. We believe they can't keep up with the leading self-driving truck companies.



Udelv has been doing **commercial deliveries for Walmart** for some time. With the **'Transporter'** they now have their own **versatile special purpose vehicle**, equipped with Mobileye's promising SDS. It's been quite around Udelv for a while – as other companies, Udelv seem to struggle towards industrialization of its vehicle.



Amazon has **invested in Aurora and conducted road tests with Embark, which later didn't survive market consolidation**. Amazon's vision could be to cover the entire logistics chain - in the future also with autonomous trucks, delivery vehicles and last mile delivery solutions.



Little is still known about Tesla's Semi Truck and targeted automated driving capabilities. According to the company, it will be the first vehicle to drive fully autonomously. The truck is to be equipped with **'enhanced' autopilot functionalities for automated highway driving**. At least we still have doubts.

## Latest news

Ford, VW-backed Argo AI is shutting down.

(26.10.2022)

[Read](#)

Ziegler orders autonomous and electric delivery vehicles from the company Udelv.

(05.01.2022)

[Read](#)

Amazon stops field tests of its delivery robot Scout.

(07.10.2022)

[Read](#)

Apple chip maker TSMC to manufacture Tesla's new FSD hardware.

(23.11.2022)

[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced



## Goods Transport & TaaS NAR

### At a glance



Robomart has teamed up with a couple of companies to establish the **Autonomous Retail Collective (ARC)**, an ecosystem aimed at developing and advancing self-driving shops. Collaboration is key in the autonomous mobility space – therefore, Robomart is worth to 'watch-out'.



Applied Intuition provides various solutions for its customers, including an ADAS and AD development platform, a vehicle software platform, and an **autonomy stack aimed at off-highway autonomy and trucking**. In 2023, the company **acquired Embark's trucking assets**, which may serve as the basis for their autonomy stack.

### Latest news

Robomart unveils autonomous retail collective to propel self-driving shops.

(08.04.2024)

[Read](#)

Applied Intuition expands IP portfolio through Ghost Autonomy deal.

(22.10.2024)

[Update](#)[Read](#)

### L4 target

Not announced

Not announced





































# Goods Transport & TaaS. Asia.

Partnering & Value Chain, Level 4 Target & Latest News


















































# Goods Transport & TaaS ASIA

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
    (Sensor fusion)	  			 				 			Not announced
											
  				  				  			Not announced
























# Goods Transport & TaaS ASIA

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5			
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider		Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport		3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
 ZVISION 	 			  		Not announced		             				
		 				Not announced		Not announced		Not announced		
 	 	 				Not announced		    	  	 		



































































# Goods Transport & TaaS ASIA

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider		Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport		3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
<div>OUSTER</div> <div></div> <div>HERAI</div> <div></div> <div>ZVISION</div>	<div></div>	<div></div>		<div>ISUZU</div>		Not announced		<div></div> <div></div>	<div>Tencent 腾讯</div> <div>SD maps – probably consumer vehicles only</div>			
<div></div> <div>ORBE</div> <div>WEI FU 威孚</div>	<div></div>	<div></div>		<div></div>		<div></div> <div></div>		<div>Hengtongyuan Group</div>	Not announced			
Not announced		<div></div> <div>apollo</div>		<div></div>		Not announced		<div></div> <div></div>				<div>Qualcomm</div>
<div>Core Business</div> <div> Partnership or supplier deal</div> <div> Investment</div> <div> Acquisition</div> <div> Parent / Subsidiary</div> <div> Update</div>												



# Goods Transport & TaaS ASIA

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider	Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport	3 <sup>rd</sup> party HD Maps	Cloud	V2X & Others
<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div>Not announced</div>				
<div></div>	<div></div>	<div></div> <div>TIER IV</div>	<div></div>	<div></div>		<div>Not announced</div>	<div>Not announced</div>	<div>Not announced</div>			



# Goods Transport & TaaS ASIA

## At a glance



Pony.ai is a leading player in L2+ solutions for OEMs as well as L4 robotaxi deployments. However, Pony **will jointly develop premium autonomous heavy-duty truck with SANY and Sinotrans**. They are among the pioneers in the Chinese self-driving truck market.



WeRide, initially focusing on robotaxi business, unveiled **China's very first L4 self-driving cargo van** in September 2021. While WeRide is a leader in China in terms of robotaxis, we are curious to see if they will take this position in the logistics space as well. The company also has a robosweeper in its portfolio.



**Investments from Bosch, Nio and BAIC** made Trunk.Tech known outside China. It is without question **one of the most promising startups** in the Chinese self-driving truck / freight haulage space.



Chinese startup with the **aim to build a nation-wide freight network** using autonomous trucks. Unlike other AV truck companies, **Inceptio initially focuses on L3**. However, Inceptio could possibly be a hidden champion among autonomous trucks with regard to full autonomy - at least in China.

## Latest news

Pony.ai allowed to test Robotaxi, autonomous truck on Guangzhou's expressways.

(21.05.2024)

[Read](#)

WeRide's Robovan permitted to conduct unmanned open-road test in Guangzhou.

(24.05.2024)

[Read](#)

Autonomous truck solution developer Trunk.Tech bags hundreds of millions of yuan.

(07.05.2024)

[Read](#)

Inceptio powers launch of DFCV's Hi-Truck Tianlong Autonomous GX/KX Series.

(27.09.2024)

[Update](#)
[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced



# Goods Transport & TaaS

## At a glance

SAIC



SAIC Hongyan, in collaboration with UTOPILOT, launched a 5G+L4 smart heavy truck that completed fully driverless testing & operations on public roads by 2023. Within 3 years, a fleet of ~300 truck was formed, making it the **world's largest commercial fleet of smart heavy truck**. By 7/2024, the fleet has accumulated **>10 million kilometers** of AD operation.

NEOLIX



Nearly **1,000 Neolix delivery vehicles have been deployed** in nine countries and **over 40 cities worldwide**, with a cumulative mileage of more than 6 million kilometers by 2024. The shuttle may be compared with Nuro, which is currently focused exclusively on the US market.

DEEPRROUTE AI



DeepRoute.ai **announced an autonomous medium-duty truck business line for urban logistics**. Having started a first commercialization project with Deppon Logistics, DeepRoute is **backed by Alibaba and its huge network** of ecommerce, logistics & community shopping, among others. Reads well.

KARGOBOT



**KargoBot** was launched during Auto Shanghai 2023 **by MaaS giant DiDi** and focuses on a pilot vehicle approach with a human driver onboard and multiple L4 trucks following its lead. We will closely trace KargoBot's development.

## Latest news

SAIC Hongyan's 5G+L4 Smart Heavy Truck to Begin Trial Operations in Danzhou.

(03.07.2024)

[Read](#)

NEOLIX's unmanned delivery vehicles greenlight for road test in Nanjing.

(19.08.2024)

[Read](#)

DeepRoute.ai collaborates with DEPPON LOGISTICS Co., LTD to expedite commercialization.

(20.06.2022)

[Read](#)

KargoBot, Elenergy to co-facilitate L4 autonomous freight service in Southeast Asia.

(19.11.2024)

[Update](#)
[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced



## Goods Transport &amp; TaaS ASIA



## At a glance



DeepWay - a **subsidiary of Baidu** - plans to offer heavy Level-3-trucks by June 2023. The vehicles will have a range of 300 km, and in addition to a fast-charging function, it will also be possible to swap batteries in 6 minutes. The integration of fuel cells is targeted for the future.



TuSimple **withdrawn from the US market (and obviously from the autonomous trucking business as a whole)**. As a former leading self-driving truck company, TuSimple is now trying to move its assets to fund a new AI-generated animation and video game business. Weird.



TIER IV is a Japan-based company **specializing in Autoware-based AD solutions**. The company aims to make autonomous mobility technology scalable and accessible, collaborating globally to **advance AVs for different industries**. TIER IV participates in projects such as METI aimed at deploying robotaxis for transportation and autonomous trucks for logistics.

## Latest news

DeepWay permitted to conduct cross-provincial autonomous heavy-duty truck pilot operations.

(08.03.2024)

[Read](#)

TuSimple Co-Founder demands company liquidation.

(26.11.2024)

[Update](#)
[Read](#)

TIER IV and Hitachi Astemo join hands on autonomous driving systems: Introducing SOAFEE-compliant SDV architecture.

(17.10.2024)

[Update](#)
[Read](#)

## L4 target

**2024-2026**

Not announced

Not announced









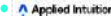


































































# Goods Transport & TaaS. Europe.

Partnering & Value Chain, Level 4 Target & Latest News

















# Goods Transport & TaaS EUROPE

LAYER 1		LAYER 2		LAYER 3		LAYER 4		LAYER 5				
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider		Cloud, V2X, others		
Sensors	Chips, SoC, Dom. Controller, ...	Virtual Driver	Simulation, V&V, OS, ...	Vehicles	Components	Fleet & Hub Operations	Fleet Monitoring & Control Center	Logistics Platform / Transport		3rd party HD Maps	Cloud	V2X & Others
 	 	 	  	DAIMLER TRUCK		Not announced		Not announced			 	
 	 TRATON   embedded systems 	   	TRATON     		     	 	   			 		
 	   	   			 		           	 				
Core Business		 Partnership or supplier deal		 Investment		 Acquisition		 Parent / Subsidiary		 Update		



























# Goods Transport & TaaS EUROPE

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider	Cloud, V2X, others		
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	 •	 •  •		  •			 •	 •  • Uber Freight •  •  •			Not announced
 •	 •			 •				Uber 			Not announced
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<div> <div>Core Business</div> <div>Partnership or supplier deal</div> <div>Investment</div> <div>Acquisition</div> <div>Parent / Subsidiary</div> <div>Update</div> </div>											


































# Goods Transport & TaaS EUROPE

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
Sensors / SoC / Computing HW		SW-Stack		AD Vehicle		Fleet Operations		Transport & Platform Provider	Cloud, V2X, others		
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Not announced		 <b>WAYVE</b>		 <b>MAXUS</b>  <b>JAGUAR</b>				 <b>ocado</b> GROUP  <b>dpd</b>  <b>ASDA</b>			
 <b>tu simple</b>  <b>kodiak</b> 		 <b>embotech*</b>  <b>STRADVISION</b>		<b>CLEVON</b>							
		 <b>driveblocks</b> <b>TIER IV</b>	 <b>Applied Intuition</b>  <b>Apex.AI</b>  <b>b-works</b>		 <b>pepper</b>  <b>SICK</b>		Not announced	Not announced	Not announced	Not announced	
Core Business		Partnership or supplier deal		Investment		Acquisition		Parent / Subsidiary		Update	



# Goods Transport & TaaS EUROPE

LAYER 1				LAYER 2		LAYER 3		LAYER 4	LAYER 5		
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	•						Not announced				Not announced
											
											



# Goods Transport & TaaS EUROPE

## At a glance

## Latest news

## L4 target

DAIMLER TRUCK



DTNA's **Cascadia trucks with an integrated Torc AV stack** are already **hitting the roads in the US** with a targeted go-to-market by 2027. Currently, there is **no roadmap for the domestic market** yet.

Daimler Truck and TORC Robotics select Aeva to supply advanced 4D LiDAR technology for series-production autonomous trucks.

(09.01.2024)

[Read](#)

Not announced

TRATON



As TRATON's partnership with TuSimple came to an end, **Scania, MAN, and International will now work together with Plus** to intensify the development of L4 self-driving trucks. The companies will focus on hub-to-hub operations – using the **same AV stack across all major TRATON brands** is a reasonable approach.

TRATON Announces Global Release Of Plus SuperDrive.

(30.10.2024)

[Update](#)
[Read](#)

Not announced

einride



The **Einride Pod** is unique from other self-driving trucks as there is **no driver's cab**. The pod currently operated in gated areas on fixed routes. Towards L4 with higher speeds on public roads there need to be leaps in development. However, Einride's ecosystem is unique.

DP World and Einride announce Middle East's largest deployment of electric, autonomous freight mobility, spearheading the region's sustainable transition.

(14.05.2024)

[Read](#)

Target reached in gated areas only

VOLVO



The **"Volvo VNL Autonomous"** fully redundant truck was unveiled in 2024 and will be **powered by Aurora**. In addition, **Volvo invested in Waabi** and thus betting on a second horse. The approach seems to make sense in order not to be dependent on an SDS provider in its self-driving roadmap.

The Volvo VNL Autonomous — Proving the Way Forward.

(20.05.2024)

[Read](#)

Not announced



# Goods Transport & TaaS EUROPE

## At a glance



Avride is the **rebranded, international division** of the robotaxi and delivery robot company **Yandex Self-Driving Group**. While international assets have been separated from Russian-owned Yandex assets, Avride said it's testing AVs (and probably the rover as well) in diverse ODDs across the globe, focusing on safety.



**IVECO and Plus are jointly developing self-driving trucks** and conducting **test drives on European highways**. **Pilot projects have already been announced** - so the two could be pioneers for autonomous trucks in Europe along TRATON.



Wayve does **not rely on HD maps** and **hand-coded rules** but **focuses on its deep and self-learning AI technology** based on cameras. The company raised \$1bn in 2024 to take its Tesla-like technology for self-driving to many carmakers. Let's see if delivery vehicles are still a targeted use case for Wayve.



ZF offers a **comprehensive portfolio for commercial vehicle automation** such as sensors and high-performance computers. While ZF has already **supplied L4 truck companies**, we are curious if ZF wants to become a full-stack provider with an own virtual driver - that would be ambitious as competition is strong.

## Latest news

Introducing the new generation of Avride delivery robots.

(30.10.2024)

[Update](#)
[Read](#)

IVECO, Plus, dm-drogerie markt and DSV launch automated trucking pilot in Germany.

(15.11.2023)

[Read](#)

Asda and Wayve launch UK's largest self-driving grocery home delivery trial.

(17.04.2023)

[Read](#)

Clevon collaborates with ZF to orchestrate driverless last-mile delivery fleets.

(22.02.2023)

[Read](#)

## L4 target

Not announced

Not announced

Not announced

Not announced



# Goods Transport & TaaS EUROPE

## At a glance



driveblocks develops a **modular; scalable AD software stack** for commercial vehicles. **It allows OEMs/Tier1 to integrate it with their vehicles and solutions in an open and flexible way.** The solution targets the EU market first and is a differentiating, but also ambitious approach compared to other players.



LOXO'S last mile delivery vehicle is reminiscent of some US and Chinese market players' solutions but is the **first vehicle of its kind made in Europe. Commercial success in Europe requires both a technically mature solution and a profitable business case.** In 2024, LOXO and Planzer announced a joint pilot based on an ID. Buzz, shifting away from the SPV.



**Goggo builds a European network for middle and last mile delivery services.** Mobileye and Oxbotica have been signed up - concrete details on the delivery services (e.g., vehicle type) are not yet known. We are curious to see where Goggo will position itself in the future ecosystem.



Starship delivery robots completed **>6mn autonomous deliveries.** It is **unlikely that these robots will become widely accepted for last mile delivery.** However, there could certainly be use cases in gated areas. Being a pioneer in the robot delivery space, more and more new players have entered the market.

## Latest news

TIER IV paves the way for highway trucking with innovative reference design.

(02.05.2024)

[Read](#)

LOXO expands into Germany with self-driving logistics subsidiary.

(15.11.2024)

[Update](#)
[Read](#)

Pascual makes the first delivery in Spain for hospitality with an autonomous robot by Goggo Network [ES only].

(31.05.2023)

[Read](#)

Tallinn-based Starship Technologies raises €83.6 million to make the robot delivery take over the streets.

(06.02.2024)

[Read](#)

## L4 target

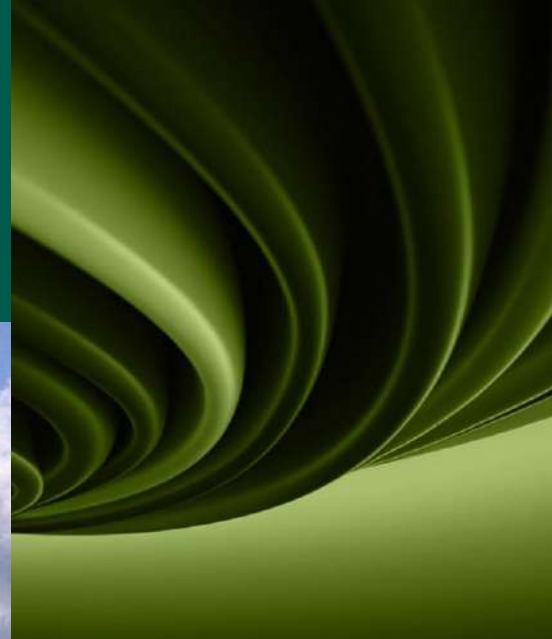
Not announced

Not announced

Not announced

Reached at various locations





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