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Chinese Independent OEMs' ADAS and Autonomous Driving Report, 2023

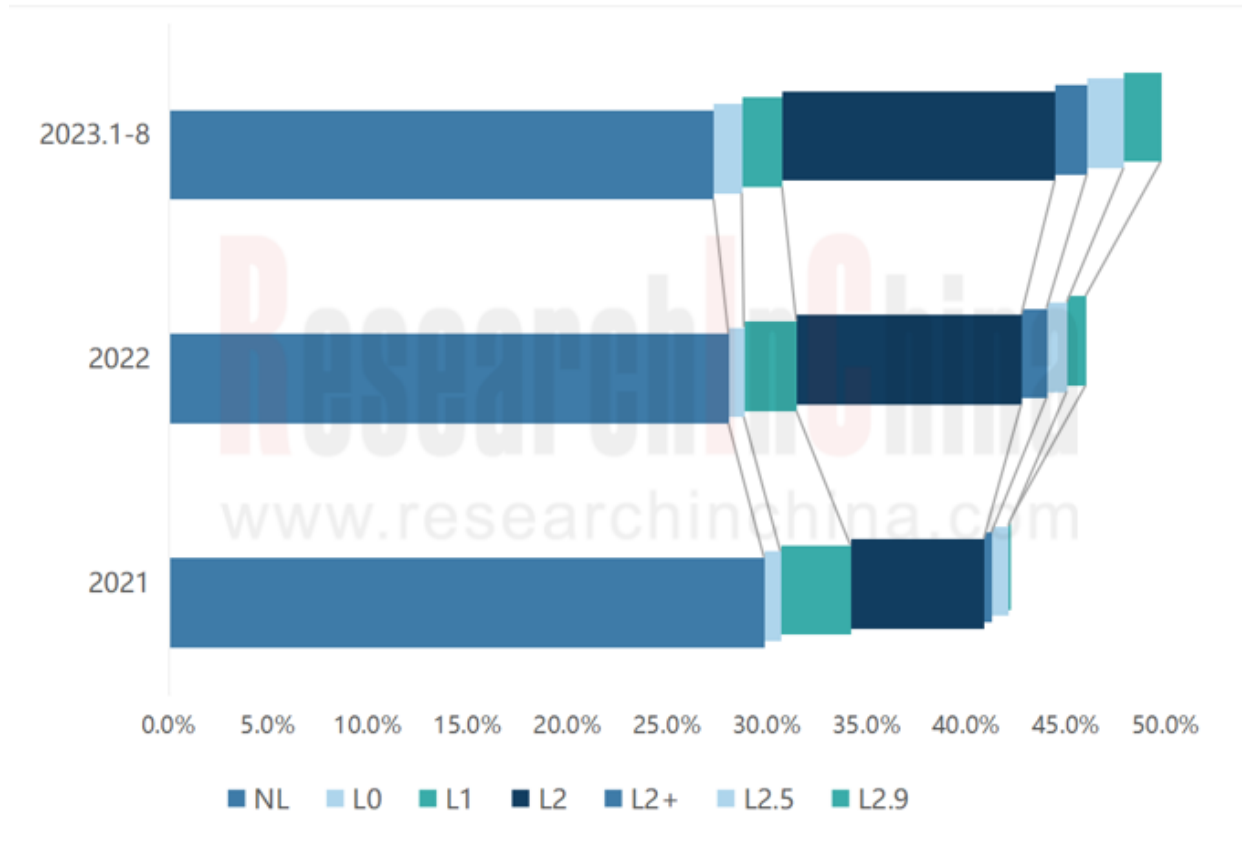
Oct. 2023

Wide adoption of NOA begins, and local brands grab market share.

1. Wide adoption of NOA begins, and local brands grab market share.

According to ResearchInChina, from January to August 2023, joint venture brands accounted for 3.0% of installations of L2.5 and higher-level systems, mainly driven by Tesla; the proportion of independent brands was 3.7%, up 1.8 percentage points from 1.9% in 2022. From January to August 2023, independent brands took up 1.9% of installations of L2.9 systems, up 1 percentage point from that in 2022. Urban NOA is mainly available to Li Auto, NIO, Avatr, AITO and Xpeng.

ADAS Penetration Rate of Independent Passenger Car Brands in China (by Level), 2021-Aug. 2023



Source: ResearchInChina

Independent brands are working to deploy NOA

As per the models and plans released by automakers, independent brands are working to deploy NOA, and they are beginning to reduce the price and improve the configuration, which means they intend to occupy the market ahead of others, by virtue of "cost performance".

For example, the new AITO M7, launched in September 2023, is priced at RMB249,800-329,800 (the price of the old model is RMB319,800-379,800). The new M7, equipped with 27 sensors including a roof LiDAR, 3 radars, 11 high-definition cameras and 12 ultrasonic radars, supports Huawei ADS 2.0 and enables high-level intelligent driving on highways and in urban areas without HD maps. Up to now, AITO has realized the commercialization of NOA in six cities without using maps, which is expected to be available to up to 45 cities in the fourth quarter.

In October 2023, IM LS6 (including four editions) was launched on market. Equipped with the IM AD intelligent driving system, it is priced at RMB229,900-291,900 (limited-time offer: RMB214,900-276,900). The IM AD system valued at RMB36,800 (NVIDIA OrinX, a LiDAR, 3 radars, 11 cameras and 12 ultrasonic radars) features highway NOA and urban NOA (some functions are realized via OTA updates).

According to IM's plan, the urban NOA on IM LS6 will be tested on public roads at the end of 2023, or will be launched before the 2024 Spring Festival, first available in Shanghai. In mid-2024, "non-map" urban NOA may be implemented; within 2024, the commuting mode will cover 100 key cities across China.

Urban NOA Launch and Planning of Independent Passenger Car Brands in China, as of Oct. 2023

OEM	Models with Urban NOA	Launch of Urban NOA
Changan	Avatr 11	At present, it covers 6 cities and is expected to expand to 45 cities by the end of the year.
BAIC	New ARCFOX αS HI	At present, it covers 6 cities and is expected to expand to 45 cities by the end of the year.
NIO	ET/ES/EC	In July 2023, urban NOP+ was launched in Shanghai and Beijing. It is conceivable that it will cover a total of 60,000 kilometers in Q4 2023, 200,000 kilometers in Q1 2024, and 400,000 kilometers in Q2 2024.
Xpeng	G6/G9/P7i	The urban NGP function is available in five cities now, and is expected to expand to 50 cities by the end of 2023 and 200 cities in 2024.
Li Auto	L7/L8/L9 Max	In June 2023, urban NOA that does not rely on HD maps was pushed; In September 2023, the beta version of commute NOA was launched in 10 cities; In December 2023, commute NOA will expand to 100 cities; In Q2 2024, commute NOA will cover all scenarios.
Great Wall Motor	WEY Lanshan	It is expected to be unveiled in Q1 2024 and land in 100 cities in 2024.
BYD	Advanced version of DENZA N7	It is expected to be released in Q1 2024.
Geely	ZEEKR 001	Highway NXP will be available in Q3 2023. There is no plan for urban NXP.
GAC	Hyper GT	Unavailable
SAIC	IM L7/LS7	Unavailable now. In October 2023, it was officially released for public beta. The commuting mode will be opened to 100 cities in 2024, and all-scenario commuting will be realized in 2025.
Neta	Neta S	Unavailable now. It is expected that urban NXP will be pushed to models equipped with NETA Pilot 4.0 in H1 2024.
AITO	New AITO M7/AITO M5 Intelligent Driving Edition	As of October 2023, NOA had been available in 15 cities. It is expected that it will spread to 45 cities in the fourth quarter.

Source: ResearchInChina

In view of the difficulty of all-scenario urban NOA, many OEMs start with commute NOA

2. In view of the difficulty of all-scenario urban NOA, many OEMs start with commute NOA.

Commute NOA, also known as urban memory driving, tailors the "urban driving assistance" route according to users' mobility habits. Compared with urban NOA, commute NOA can be trained on a single vehicle. It can achieve the vision of 99% autonomous driving on fixed routes based on the user's driving routes and memorized trajectories. Li Auto revealed that simple routes can be trained in one week, and complicated routes take 2-3 weeks.

Commute NOA Launch of Independent Passenger Car Brands in China, as of Oct. 2020

OEM	Commute NOA	Release / Launch Time	Description
Wuling	Memory driving	Aug. 2023	<p>When using this function for the first time on a certain route, the user needs to drive by himself/herself and memorize the trajectory; when arriving at the destination, the user clicks to save the route. Later, when driving on the same route again, through memory driving, the system selects the previously saved route and combines it with real-time traffic data to provide an experience similar to the Lite version of urban NOA.</p> <p>Features: The cost is about RMB5,000, and the decision can be made according to the real-time road conditions.</p>
Xpeng	AI driving	Released in Jun. 2023 Pushed in Q4 2023	<p>The user turns on the AI driving function on the center console screen and sets the navigation from point A to point B before driving. After learning the driving and returning to the route again, the system will prompt that the AI driving function can be activated.</p> <p>Features: Allows for multiple private customization modes, and automatic training computing storage</p>
Li Auto	Commute NOA	Aug. 2023	<p>In the early stage, a human driver is required to drive the vehicle to realize point-to-point commuting. The vehicle itself will also sense and record the information of road sections through the sensors on the body for its own Neural Prior Net (NPN) algorithm to extract and call and learn.</p> <p>Features: Simple routes can be trained and activated in one week, and it takes 2 to 3 weeks to train complicated routes.</p>

Source: ResearchInChina

Independent conventional OEMs compete for talents to enhance the technical capabilities of their intelligent driving teams

3. Independent conventional OEMs compete for talents to enhance the technical capabilities of their intelligent driving teams.

In the process of upgrading from L2 to L3 intelligent driving, the technical capabilities of the original intelligent driving teams of independent conventional OEMs can't keep up with the development trend of industrial technologies. Therefore they have poached technical experts from bellwethers, technology companies, and emerging carmakers to improve the technology level of their intelligent driving teams.

For example, in August 2023, BYD invited Liao Jie, the former Intelligent Driving R&D Director of Horizon Robotics, to serve as the head of BYD's intelligent driving team in Shanghai. In September 2023, Tao Ji, the former CEO of Autra.tech, a L4 truck company, joined Changan Automobile to take in charge of intelligent driving technology. Tao Ji used to work with Baidu as the general manager of the autonomous driving division of Intelligent Driving Group (IDG) and the general manager of intelligent transportation product research and development. He participated in the entire founding process of Baidu's autonomous driving project team from 0 to 1.

Senior Executive Introduction of Independent Passenger Car OEMs in China, 2023

OEM	Senior executive	Before	After
Changan Automobile	Tao Ji	He used to work with Baidu as the general manager of the autonomous driving division of Intelligent Driving Group (IDG) and the general manager of intelligent transportation product research and development	In September 2023, he served as the general manager of Changan Automobile Intelligent Driving.
BYD	Liao Jie	The Intelligent Driving R&D Director of Horizon Robotics	In August 2023, Liao Jie served as the head of BYD's Shanghai intelligent driving team affiliated to the Planning Institute
	Xu Yingchun	Vice President of Li Auto Computing Platform	He joined BYD after May 2023
Geely	Chen Qi	Director of Huawei's Autonomous Driving R&D Division	In November 2021, he served as the vice president of ZEEKR Autonomous Driving.
	Jiang Jun	Huawei's Autonomous Driving COO & Head of Maps and Data	In August 2023, he served as the vice president of ZEEKR Intelligent Technology, responsible for the intelligent cockpit business.
	Guo Yang	Chief Product Architect of Baidu's Intelligent Driving Business Group	In July 2023, he joined Geely Research Institute to handle Geely's intelligent driving business.
Chery	Gu Junli	Vice President of Xpeng's Autonomous Driving R&D	In February 2023, he served as the deputy general manager of Chery Automobile Co., Ltd. and the general manager of Dazhuo Intelligent Technology Co., Ltd.
Great Wall Motor	Gu Weihao	General Manager of Baidu's Smart Car Division	In February 2021, he served as the CEO of Haomo.AI.

Source: ResearchInChina

The upstream and downstream of the industry chain jointly promote solutions with optimal performance and cost

4. The upstream and downstream of the industry chain jointly promote solutions with optimal performance and cost.

HD maps have low city coverage, high collection cost and unstable update frequency, which are insoluble problems for the industry, so major OEMs have reached an industry consensus on “low-weight map” solutions.

In August 2023, IM Motors and Momenta released a solution based on Data Driven Landmark Detection (DDL) technology without using HD maps. The DDL model can replace HD maps, construct maps in real time during driving, integrate the road features recognized in multiple mappings to generate road topology, and predict road network information that is difficult to observe with conventional perception algorithms. The solution was first mounted on IM LS6, and used for NOA public beta in September 2023 without HD maps.

Summary of Main OEMs Adopting "Low-Weight Map" Technical Solutions

OEM and Supplier	Time	Technology
Great Wall Motor - Haomo.AI	Sep. 2022	The urban NOH of HPilot 3.0 adopts the technology route of "heavy-weight perception, low-weight maps, and high computing power"
Changan - Avatr	Apr. 2023	Huawei ADS 2.0 intelligent driving system
BAIC - ARCFOX α		
Xpeng	Mar. 2023	XNGP intelligent driving system
Li Auto	Jun. 2023	Bird's eye view (BEV) algorithm + self-developed NPN algorithm
NIO	-	According to the plan of NIO, the NAD intelligent driving system will be free of maps in the future.
IM	Aug. 2023	IM and Momenta jointly released a solution based on DDL (Data Driven Landmark Detection) without using HD maps

Source: ResearchInChina

Tier 1 suppliers are actively introducing new solutions to reduce the cost of sensor solutions

In addition, Tier 1 suppliers are actively introducing new solutions to reduce the cost of sensor solutions.

In April 2023, DJI released a thousand-yuan intelligent driving solution which uses 7V/9V vision-only configuration to achieve L2+ intelligent driving functions, including urban memory driving (32TOPS)/urban NOA (80TOPS) through "strong visual online real-time perception", without relying on HD maps or LiDAR". In September 2023. The 7V solution was launched on market with the Linxi Edition of Baojun Yunduo 460 Pro priced at RMB125,800. Thus high-level intelligent driving functions are popularized to mainstream RMB100,000 family cars. After several years of low-profile development, DJI's designated projects surged in 2023. It is estimated that more than 20 cars models will carry intelligent driving products from DJI by the end of 2024.

In October 2023, Haomo.AI released three "cost-effective" driving-parking integrated products - HP170 (5TOPS), HP370 (32TOPS) and HP570 (72TOPS or 100TOPS), which enable non-map highway NOH, city memory driving, and all-scenario non-map urban NOH, with the price of RMB3,000, RMB5,000 and RMB8,000 respectively.

HP570 of Haomo.AI

Haomo.AI HP570 all-scenario urban NOH with the ultimate cost performance but without maps

RMB8,000 | all-scenario urban NOH without maps | 100+ cities (1L (optional) 11V1R12U)

Computing power: 72/100TOPS	Flexible sensor configuration Optional 360° sensor without blind spots for LiDAR	Urban NOH	Active safety Five-star AEB-ENCAP rating
	<ul style="list-style-type: none"> ● Front view camera * 2 ● Side view camera * 4 ● Rear view camera * 1 ▲ Fisheye camera * 4 ● Front radar * 1 ● LIDAR * 1 (optional) ■ Ultrasonic radar * 12 	Highway/urban expressway NOH	Cross-floor teaching-free HPA
		Intelligent obstacle avoidance in all scenarios	APA in all scenarios
		Full-speed smart cruise	RPA
		Smart overtaking and lane changing	360° surround view

The price of the complete set of hardware

Source: Haomo.AI

In general, the "involution" in the NOA market has stimulated OEMs to quickly implement high-level driving assistance for greater competitive edges. However, the high-level intelligent driving technology is highly complex. In a short window period, OEMs with insufficient self-development capabilities will prefer large Tier 1 suppliers like Huawei and DJI, which have enough mass production experience, and advanced and mature technologies.

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