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China Passenger Car Driving- parking Integrated Solution Industry Report, 2023

July 2023

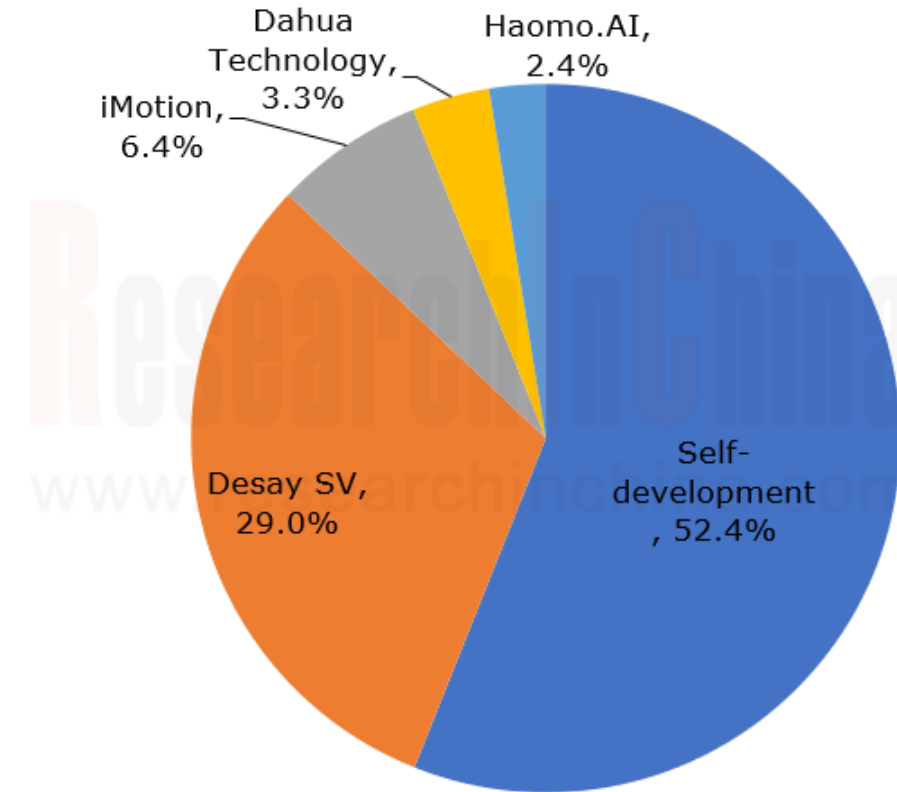
Research on driving-parking integration: with the declining share of the self-development model, suppliers' solutions blossom

Local suppliers lead the driving-parking integration market.

The statistics of ResearchInChina show that from January to May 2023, the installations of driving-parking integrated solutions in production vehicle models were 490,000 sets, soaring by 138% on a like-on-like basis, and the installation rate hit 6.7%, up 3.8 percentage points over the same period last year. It is predicted that the installations in 2025 will reach 6.19 million sets, and the installation rate will be 30%.

In terms of driving-parking integrated domain controller suppliers, from January to May 2023, automakers' products built by way of "self-development + OEM" prevailed in the market, with a combined 52.4% share. The typical automakers that adopted the self-development model were emerging carmakers like Tesla and NIO.

Top 5 Suppliers of Passenger Car Driving-parking Integrated Domain Controllers in China, Jan-May 2023



Source: ResearchInChina

Shares of passenger car driving-parking integrated domain controller suppliers

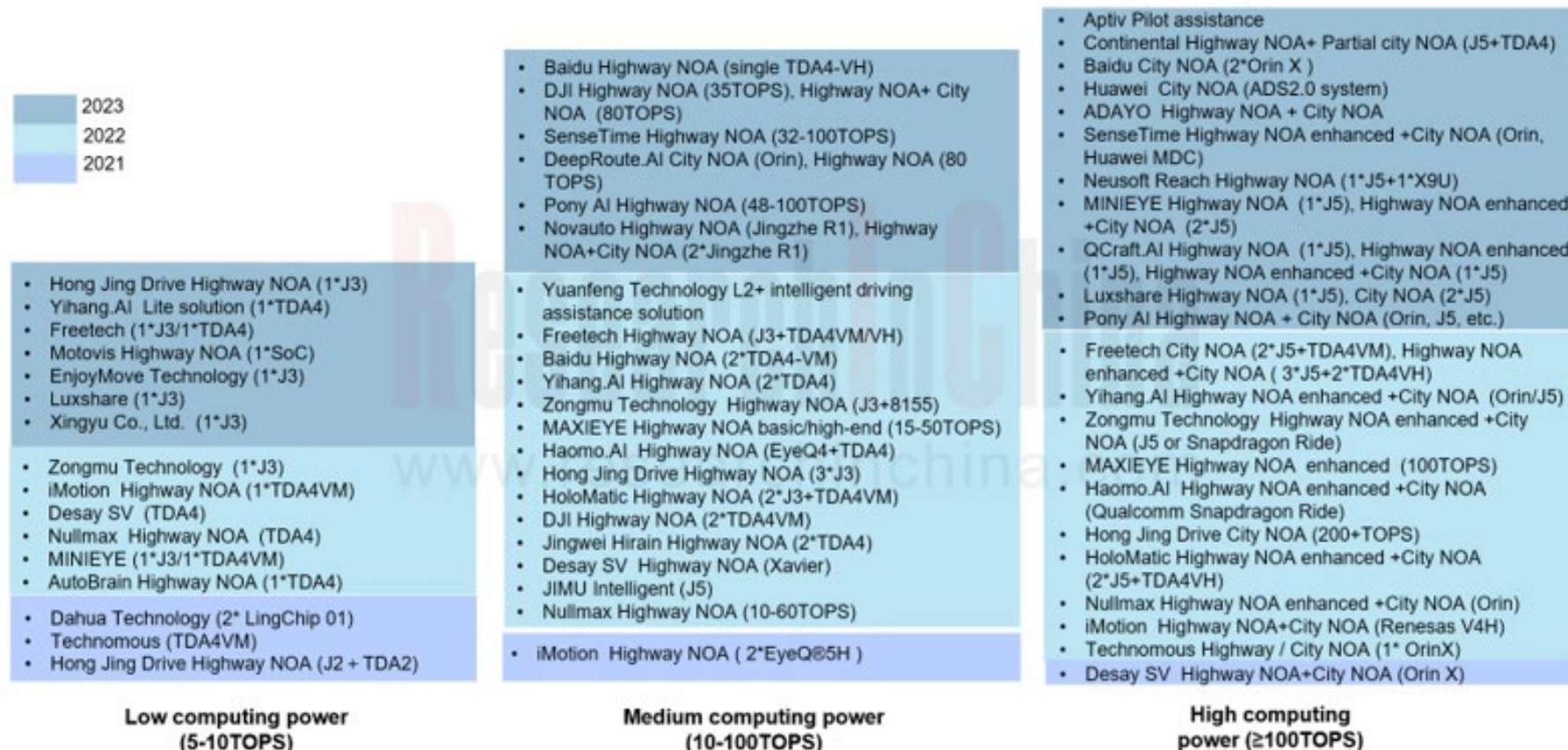
From the shares of passenger car driving-parking integrated domain controller suppliers, it can be seen that the share of the “self-development + OEM” model declined from 77% in 2021 to 52.4% in the first five months of 2023. It shows that suppliers are becoming mainstream. In the driving-parking integration market, the solutions of suppliers tend to be diversified and abundant.

Market Shares of Passenger Car Driving-parking Integrated Domain Controller Suppliers in China, 2021-2023

Rank	Supplier	2021	2022	Jan-May 2023
1	Self-development + OEM	77.0%	59.1%	52.4%
2	Desay SV	17.3%	19.2%	29.0%
3	iMotion	1.3%	8.6%	6.4%
4	Dahua Technology	0.9%	5.3%	3.3%
5	Haomo.AI	2.1%	4.1%	2.4%

Source: ResearchInChina

Layout of Driving-parking Integrated Solution Suppliers (as of Jun. 2023)



Source: ResearchInChina

Local Tier 1 suppliers lead the driving-parking integrated solution market

Local Tier 1 suppliers lead the driving-parking integrated solution market for the following reasons:

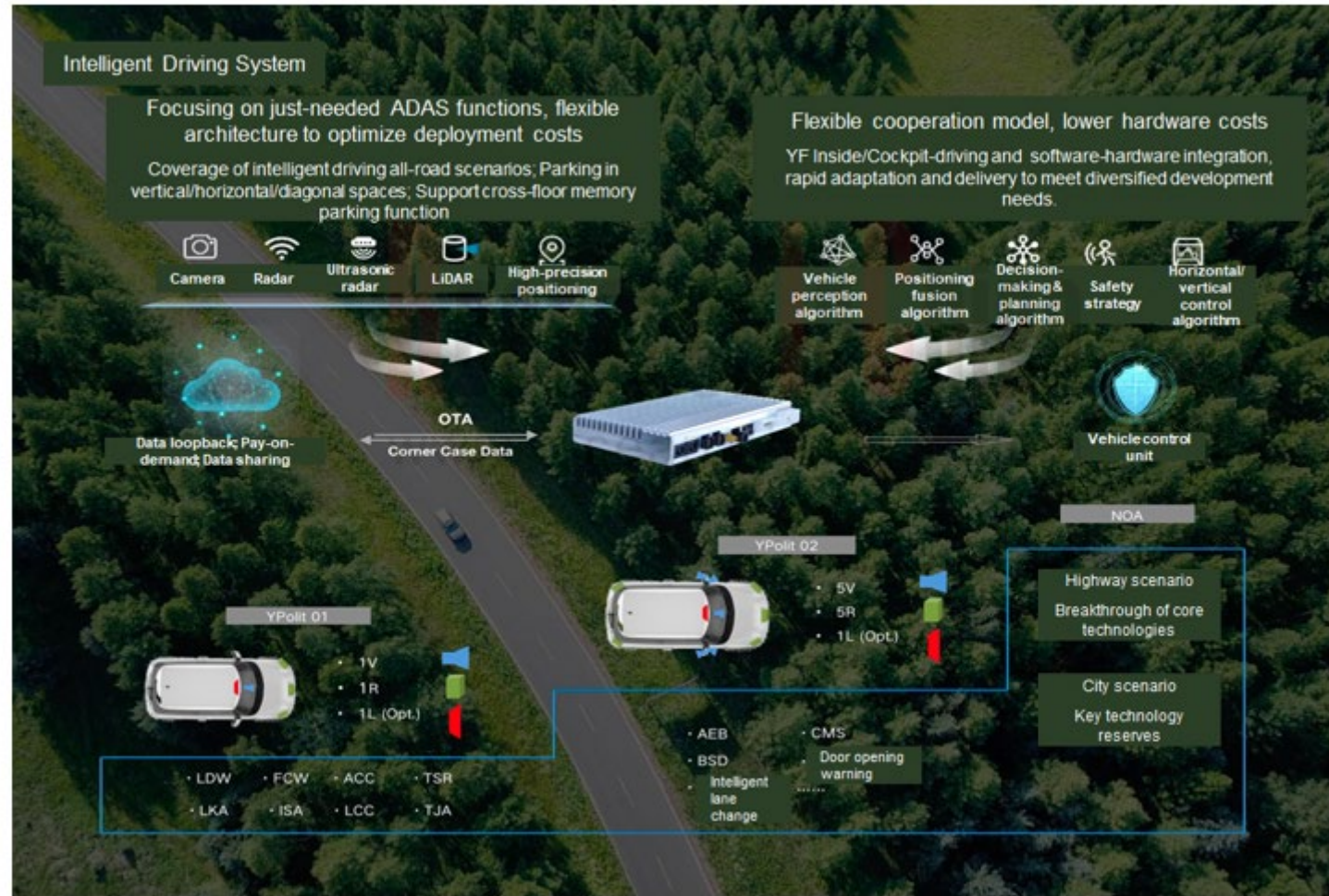
Local suppliers have deployed driving-parking integration early and made continuous efforts to improve their hardware and software full-stack development capabilities. For example, Desay SV has started to make layout in the driving-parking integration market since 2020, and has become a supplier that integrates the "hardware + underlying software + middleware + system integration" capabilities. As concerns Yuanfeng Technology's L2+ driving-parking integrated solutions, the company not only independently develops autonomous driving domain controllers, but also deep learning algorithms which enable fused positioning covering GNSS, IMU, lane lines, semantic SLAM, wheel speed & mileage, etc. Its solutions can remodel the environment according to multi-sensor perception (camera, radar, etc.) and positioning data, for the purpose of global path, trajectory and behavior prediction planning, as well as transverse and longitudinal control and actuator management. At present, the mass-produced Super Park 1.0 solution delivers a parking space recognition accuracy of 97% and a parking success rate of 95%, covers over 180 types of mainstream parking spots, and supports head-in parking; for unconventional parking spaces, the custom AR parking allows users to deal with in stride.

Local suppliers provide flexible and open cooperation models to meet the differentiated and customized needs of OEMs. For instance, the Baidu Apollo Self Driving Openness White Paper Baidu released in April 2023 indicates four key capabilities: open product experience definition for automakers, open independent experience evolution, open full-cycle OTA services, and open co-creation with car manufacturing partners. Freetech takes the ODIN intelligent driving digital base as the pillar and deploys products and solutions in each module, providing modular services.

The product iteration is fast and responds to the local market needs more quickly. Examples include Haomo.AI's HPilot, a passenger car driving assistance solution that has undergone six OTA updates since its release in 2020 and has been iterated to HPilot 3.0, with its advanced intelligent driving capabilities covering three major scenarios: highway, parking, and city open roads.

With regard to the adaptability of chip platforms, some suppliers can cover a number of mainstream chip platforms of NVIDIA, TI, Horizon Robotics and the like. In HoloMatic's case, the platforms it has adapted or is adapting to include TI TDA4, Huawei MDC610, Horizon Journey 2/Journey 3/Journey 5, and NVIDIA Orin.

Yuanfeng Technology's L2+ Driving-parking Integrated Solution



Source: Yuanfeng Technology

The mass adoption of driving-parking integration starts in 2023.

Starting from 2023, driving-parking integrated solutions enter the stage of mass adoption. According to the planning of suppliers, there are up to 20 mass production projects from 2023 to 2024.

For example, Aptiv's driving-parking integrated solution launched in April 2023 can be divided into Core and Pro versions by configuration. Wherein, the sensing system of the Pro version packs Aptiv's next-generation 4D imaging radar, and thus enables NOA and VPA functions. Its driving-parking integrated domain controller solution will be mass-produced and become available in 2024.

Amphiman 3000, Zongmu Technology's driving-parking integrated solution unveiled in July 2022, is based on one J3 chip, and supports the basic configuration of 1R5V12U, which can be extended to 3R5V12U or 5R5V12U. This solution enables HWA/ALC driving function, APA/RPA parking function, AVM (around view monitor)/reversing camera, power-duration curve (PDC) optimization, backtrack, and customized parking spaces. The solution is scheduled to be mass-produced in 2023.

Hong Jing Drive's driving-parking integrated solution introduced in December 2022 is based on one J3 chip and supports 5R5V12U. This solution enables NOP-H driving and APA/remote parking functions. In the future, it can be upgraded to support home-zone parking assist. It is also expected to be spawned in 2023.

Driving-parking Integrated Solutions Planned for Mass Production, 2023-2024 (Part)

Supplier	Driving-parking Integrated Product	Launch Time	Chip	Computing Power (TOPS)	Supported Sensor Access	Supported ADAS Level	Supported Functions		SOP
							Driving	Parking	
Aptiv	CORE	Apr. 2023	-	-	5R6V12U	-	NOA	Automated parking, etc.	2024
	PRO	Apr. 2023	-	-	5R11V12U	-	NOA	VPA	2024
Zongmu Technology	Amphiman 3000	Jul. 2022	1*J3	5	5R5V12U	L2	HWA/ALC/LDW/FCW/AEB/FSR A/TJA/ICA/BSD/DOW/LCA/RCT A/etc.	AVM / reversing camera / APA / RPA / L-AEB / PDC / SDW / OTA / OTF2.0 / PDC optimization / backtrack / customized parking space / lens dirt detection / towing hook detection / shadow mode, etc.	2023Q2
	Amphiman 5000	Jul. 2022	J3+8155	-	5R5~6V12U	L2.9	Highway NGP functions, e.g., automatic on/off-ramp, automatic lane change for overtaking	Memory mapping / one-button parking/ smart summon /remote monitoring, etc.	2023Q3
	Amphiman 8000	Jul. 2022	J5/Snapdragon Ride	-	5R11V12U, extended to 5R11V12U3L	L2.9	Highway NGP and extended to City NGP	HPP/AVP	2024Q4
Hong Jing Drive	HyperPilot 3.0	Under development	-	200+	5R11V12U1L	L3	City NOA	AVP	2023
	Single-SoC Driving-parking Integrated Solution	Dec. 2022	1*J3	5	5R5V12U	L2	Active safety / lane-level navigation / automatic lane change / automatic on/off-ramp / large vehicle avoidance, etc.	APA/RPA, to be upgraded to HPP in the future	2023Q2
HoloMatic	HoloArk 1.0	Dec. 2022	2*J3+TDA4VM	18	5R10V12U	L2+	Highway NOA	Valet parking (limited) / HPA	2023
	HoloArk 2.0	Dec. 2022	2*J5+TDA4VH	288	5R11V12U1L	L4	Highway NOA/City NOA	Valet parking (generalized) / HPA	2023/2024
MAXIEYE	MAXIPILOT2.0-PRO	2022	Single SoC	15-50	5R6V12U	L2+	LDW/LCC/iACC/AEB/TJA/AHBC /TSR/TLR/BSD/DOW/FCTA (B)/ESA/ILC/ALC	APA / HPA	2023
Pony.AI	PonyClassic	Jan. 2023	J5, Orin or chip platforms with or similar computing power	48-100	3R7V12U	-	Active safety/ADAS/Highway NOA	Automated parking / HPA	2023Q3

A number of models equipped with driving-parking integrated solutions will be available on market in 2023 and beyond

According to OEMs' planning, a number of models equipped with driving-parking integrated solutions will be available on market in 2023 and beyond.

For example, in 2023, Chery EXEED VX (Lanyue) with iDC Mid Domain Controller is already on sale; the GAC Hyper GT with HoloMatic's driving-parking integrated intelligent driving system has been launched on market; BYD will sell a model in cooperation with Horizon Robotics (Journey 5); Great Wall Motor will launch the new Mocha DHT-PHEV and the WEY Blue Mountain both equipped with HPilot 3.0; the new Voyah FREE with the Apollo Highway Driving Pro solution will be available on market in H2 2023. In 2024, FAW Hongqi E001 and E202 are expected to be mass-produced and will pack a driving-parking integrated domain controller based on the Huashan-2 A1000L series chips. In addition, Dongfeng Passenger Vehicle's first all-electric sedan and first all-electric SUV, as well as several SOL-branded production models, will also bear the Huashan II A1000 chips.

DeepRoute.AI's D-AIR Driving-parking Integrated Product

Advanced driving assistance, new experience of human-vehicle co-driving



Source: DeepRoute.AI

Driving-parking integrated solutions that emphasize perception over maps are becoming mainstream

At present, Haomo.AI, IM Motor, Li Auto, Baidu, Pony AI, QCraft.AI, AutoBrain, DeepRoute.AI and DJI among others have revealed driving-parking integrated solutions with “more weight on perception, less weight on maps.

For example, HPilot 3.0, a city NOA product Haomo.AI unveiled in April 2022, supports 5R12V12U2L, and relies on the LiDAR + radar + camera perception capability, riding itself of HD maps. This solution enables such functions as automatic lane change for overtaking, traffic signal recognition and vehicle control, complex intersection passing, and unprotected left/right turn in urban environments. Haomo.AI’s timing-based Transformer model allows for virtual real-time BEV mapping, bringing more stable and accurate perception outputs. Additionally, Haomo.AI also puts forward introduction of Transformer into its MANA data intelligence system, and gradual use of it in real road perception tasks, including obstacle detection, lane line detection, drivable area segmentation, and traffic sign recognition.

Furthermore, Haomo.AI forged a partnership with Navinfo in April 2023. Navinfo will help Haomo.AI to implement the plan of launching City NOH in 100 cities in an orderly manner in 2024.

In March 2023, DeepRoute.AI announced the D-AIR, a driving-parking integrated product based on Driver 3.0 (DeepRoute-Driver 3.0) technology framework. This solution supports 3R7V, and is free from HD maps through the emphasizing perception + navigation map approach. It enables highway NOA and basic urban assistance functions such as ACC, LCC, ILC, AEB and APA. Wherein, Driver 3.0 can perceive the fine road information covered by HD maps, including lane lines, traffic signals, road signs and warning signs. Moreover, Driver 3.0 can locate the vehicle in real time, and accurately judge the lane where the vehicle is and the distance from the adjacent lane line.

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- 5.18.1 Profile
- 5.18.2 Driving-parking Integrated Solution Product Lineup
- 5.18.3 Features of SenseAuto Lowly-configured Driving-parking Integrated Low-end Solution
- 5.18.4 Features of SenseAuto Medium-configured Driving-parking Integrated M Solution
- 5.18.5 Features of SenseAuto Highly-configured Driving-parking Integrated Solution
- 5.18.6 Driving-parking Integrated Solution Relying on BEV Surround View Perception Capabilities

5.19 Voyager Technology

- 5.19.1 Profile
- 5.19.2 Driving-parking Integrated Products

5.20 Novauto

- 5.20.1 Profile
- 5.20.2 Intelligent Driving Computing Chip: Jingzhe R1
- 5.20.3 Driving-parking Integrated Solution Product Lineup
- 5.20.4 Advanced Driving-parking Integrated Reference Solution
- 5.20.5 Lightweight Driving-parking Integrated Reference Solution
- 5.20.6 Cooperation Model

5.21 Baidu

- 5.21.1 Profile
- 5.21.2 Driving-parking Integrated Hardware Platform
- 5.21.3 Driving-parking Integrated Intelligent Driving Solution ANP Prototype
- 5.21.4 Driving-parking Integrated Intelligent Driving Solution Product Lineup
- 5.21.5 Driving-parking Integrated Intelligent Driving Solution: ANP2.0
- 5.21.6 Driving-parking Integrated Intelligent Driving Solution: ANP3.0
- 5.21.7 Apollo City Drive Max Software and Hardware Solutions
- 5.21.8 Apollo Highway Driving Pro Solution
- 5.21.9 Apollo Highway Driving Pro Software and Hardware Solutions
- 5.21.10 Cooperation Model & Dynamics

5.22 Qcraft.AI

- 5.22.1 Profile
- 5.22.2 Driving-parking Integrated Solution Product Lineup
- 5.22.3 City NOA
- 5.22.4 Main Advantages
- 5.22.5 Intelligent Automatic Data Closed-loop Toolchain

5.23 Pony.AI

- 5.23.1 Profile
- 5.23.2 Core Advantages
- 5.23.3 Autonomous Driving Domain Controller Product Lineup
- 5.23.4 Driving-parking Integrated Intelligent Driving Solution
- 5.23.5 Pony Classic Highway NOA Solution
- 5.23.6 Autonomous Driving Data Closed-loop Toolchain

5.24 DeepRoute.AI

5.24.1 Profile

5.24.2 Driving-parking Integrated Product Lineup

5.24.3 Driving-parking Integrated Product: D-PRO

5.24.4 Driving-parking Integrated Product: D-AIR

6. Driving-parking Integrated Solutions of Main OEMs

6.1 Hyper GT

6.2 Blue Mountain DHT-PHEV

6.3 Baojun Yep

6.4 Chery EXEED VX (Lanyue)

6.5 HYCAN V09

6.6 ARCFOX α Hi Version

6.7 ZEEKR 009

6.8 Li Auto L9

6.9 Neta S

6.10 Xpeng G9



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