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# China Automotive Vision Industry Report, 2021

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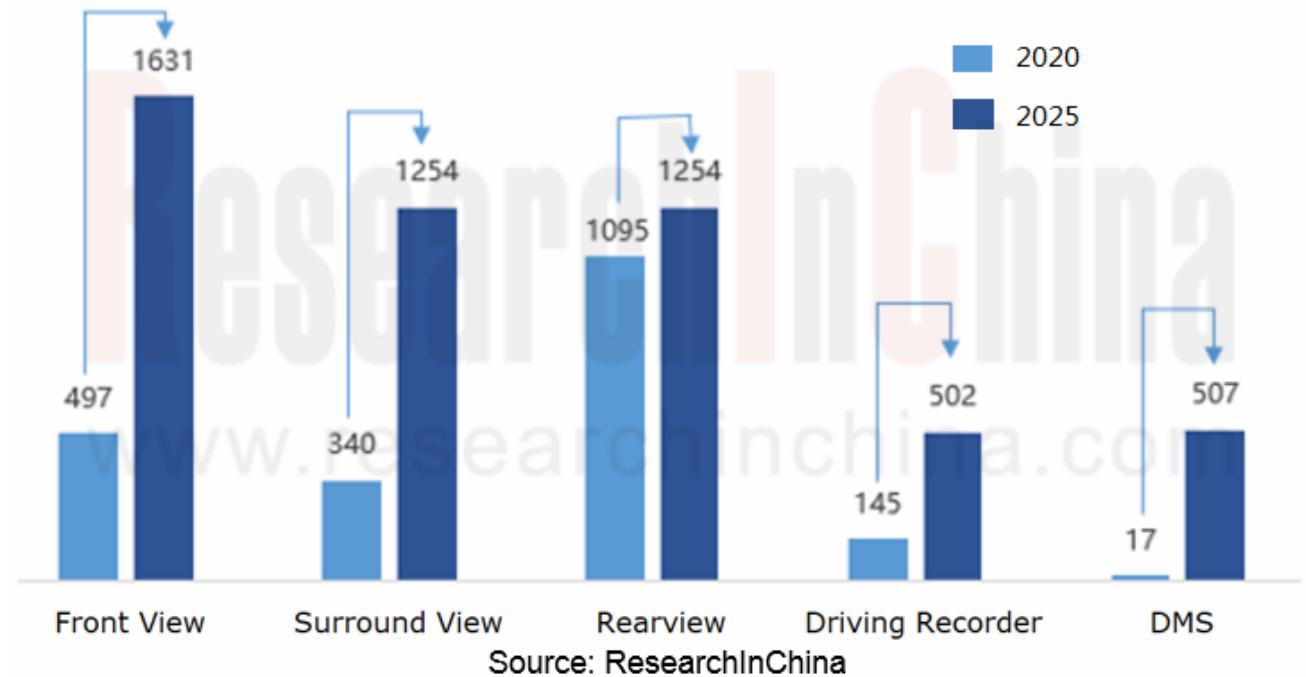
## Automotive Vision Research: With the division of labor, Mobileye's share in China is expected to exceed 55%

With the development of smart cars, the industry has gradually reached a consensus on "software-defined cars" whose core lies in the separation of software and hardware as well as embedded hardware. From January to May of 2021, many new cars released in China, such as NIO ET7, SAIC R ES33, IM L7, Xpeng P5, ARCFOX αS Huawei HI, ZEEKR 001 and so on, were embedded with a large number of sensor hardware, especially cameras, to achieve ADAS functions above L2/L2+.

In the future, as new cars equipped with high-speed autonomous driving, urban autonomous driving, and memory parking increase in volume, the demand for perception around and inside cars will further rise. It is estimated that more than 11 cameras are generally required for L2+ and above, and over 15 vision-based cameras for L4/L5.

**It is estimated that more than 16 million passenger cars in China will be installed with front view system in 2025**

## Vision System Installations of New Passenger Cars in China, 2020-2025E (Unit: 10k)



**Front View:** In 2020, 4.968 million new passenger cars in China were equipped with front view, up 62.1% year-on-year; the installation rate was 26.4%, a year-on-year increase of 10.9 percentage points. With the improvement in the computing power and increase of functions of front view system and the relative cost advantage, it is estimated that more than 16 million passenger cars in China will be installed with front view system in 2025 with the installation rate of 65%.

Currently, the front view monocular solution is the mainstream solution for Chinese passenger cars, and some companies are also exploring the application of front view cameras such as binocular cameras. In 2021, Huawei and DJI successively launched self-developed binocular cameras and solutions. Huawei's binocular cameras have been applied on ARCFOX Alpha S. DJI also plans to apply the binocular camera autonomous driving solution to Chinese models in 2021.

**Surround View:** In 2020, surround view system was available in 3.398 million cars in China, an increase of 44% over 2019; the installation rate was 18%, up 6 percentage points year-on-year. With surround view system's replacement of rearview and the addition of parking functions, surround view system installations will further jump. As surround view system is an alternative to rearview and the 360° surround view + ultrasonic solution becomes the mainstream solution for integrated parking, 360° surround view has entered a new development stage. It is estimated that the installation rate will rise to 50% in 2025.

**Visual DMS:** According to ResearchInChina, more than 10 new passenger car models, such as Changan Automobile, NIO, Xpeng, WEY, EXEED, Neta, Leapmotor, Geely, WM Motor, GAC Aion, etc., in China was equipped with DMS in 2020. In 2020, DMS was seen in 173,000 cars, with the installation rate of 0.9%. By 2025, the installation rate is expected to leap to be about 20%.

In April 2021, the Ministry of Industry and Information Technology issued Access Management Guide for Intelligent Connected Vehicle Manufacturers and Products (Trial), requiring intelligent connected vehicles to have HMI and driver monitoring functions, which released strong signals of mandatory DMS installation.

**Driving Recorder:** In 2020, 1.453 million cars in China had driving recorders, an increase of 7.6% compared to 2019. Meanwhile, the installation rate of driving recorders was 7.7%, up 0.9 percentage points from 2019.

Access Management Guide for Intelligent Connected Vehicle Manufacturers and Products (Trial), which requires intelligent connected vehicles to feature event data recording and autonomous driving data storage, will accelerate the assembly of driving recorders on new vehicles. The installation rate is expected to be 20% by 2025.

**Mobileye enjoyed about 30+% share of China's passenger car front view chip market in 2020, and it expects to seize over 55% in 2025**

According to ResearchInChina, the main suppliers of passenger car front view system in China include Denso, Bosch, Aptiv, Kostal, Panasonic, Veoneer, Continental, Jingwei Hirain Technologies, etc. The top 10 suppliers in 2020 occupied more than 90% of the market share. In China, only Jingwei Hirain Technologies was shortlisted, with a market share of 3.6%.

The chip (algorithm) supply of front view system generally has two modes: the self-developed mode (from the core chip to system integration) and the division of labor mode (the core chip is supplied by a company (such as Mobileye) while the system is integrated by Tier1 suppliers.

For example, Jingwei Hirain Technologies mainly uses Mobileye's chips for its front view system to realize the functions of identifying vehicles in front, lane lines, and pedestrians. Major customers include SAIC MAXUS, FAW Hongqi, FAW Jiefang, FAW Besturn, Roewe, MG, Geely, JMC, JAC, Sinotruk, Shaanxi Heavy Duty Truck and other automakers.

In addition to Jingwei Hirain Technologies, Aptiv, ZF, Kostal, Wistron, Yihang AI, iMotion, etc. have also established long-term cooperative relationship with Mobileye. According to ResearchInChina, Mobileye enjoyed about more than 30% share of China's passenger car front view chip market in 2020. At the same time, Mobileye continued to contact new OEMs and Tier 1 suppliers, such as Great Wall Motors, Dongfeng Motors, and Toyota. It launched a full-scale deployment plan with Volkswagen and Ford. It is expected that its market share will reach more than 55% by 2025.

**Great Wall Motors:** In 2019, Great Wall Motors said that L0-L2+ADAS based on Mobileye's technology will be integrated into a series of models in the next 3-5 years. In 2020, Big Dog, the third-generation H6, and Tank 300 were all equipped with the "monocular camera + Mobileye EyeQ4 chip vision" solution, which has realized the autonomous driving function of L2 and above.

**Dongfeng Motor:** ZF has launched its coASSIST L2+ semi-automated driving system on the 2020 Dongfeng Aeolus Yixuan which was launched late in 2020. ZF coASSIST is the cost-effective (the price is less than \$1,000) L2+ solution that helps meet Euro NCAP performance requirements while delivering the most popular Level 2+ ADAS functions utilizing Mobileye, an Intel Company, EyeQ ? technology. In the next few years, it will be applied to Dongfeng Aerolus Yixuan MAX.

**Toyota Motor:** In May 2021, ZF and Mobileye were chosen by Toyota Motor to develop ADAS for use in multiple vehicle platforms starting in the next few years. Prior to this, Toyota mainly adopted Denso's solutions.

It can be seen that the division of labor mode is more recognized by OEMs. In addition to Mobileye, Horizon Robotics is also making efforts in the field of vision chips.

The 2021 Lixiang ONE, released in May 2021, is equipped with two Journey-3 processors developed by Horizon Robotics, an 8-megapixel front view camera (effective visual distance: 200 meters, recognition angle: 120°), four surround view cameras, five radars, 12 ultrasonic radars, Lixiang's ADAS controller, and NOA navigation assistance driving capabilities.



Evolution of Core Hardware of 2021 Lixiang ONE

	2021 Lixiang ONE	2020 Lixiang ONE
Chip	Horizon Robotics Journey-3	Mobileye EyeQ4
Chip Computing Power	5 TOPS	2.5 TOPS
Camera	An 8-megapixel front view camera (effective visual distance: 200 meters, recognition angle: 120°)	A monocular front view camera (1.3 megapixel, 52°); Four surround view cameras
Radar	Four surround view cameras	1
Ultrasonic Radar	Five radars (a front radar, 4 corner radars, Bosch's fifth generation)	12
Others	12 ultrasonic radars, Lixiang's ADAS controller, HD map, etc.	HD map, etc.

Source: ResearchInChina

## Domestic suppliers consolidate the commercial vehicle market while working hard on the passenger car OEM market

Since 2017, the commercial vehicle ADAS market has been booming thanks to the mandatory installation of early warning functions such as LDWS and AEBS. Leading companies such as Continental and ZF have launched ADAS and integrated solutions for commercial vehicles. China-based MAXIEYE, Jingwei Hirain Technologies, JIMU Intelligent MINIEYE, etc. have received orders from commercial vehicle OEMs, and realized the large-scale mass production of L1 assisted driving.

While consolidating the advantages in the commercial vehicle ADAS market, local suppliers represented by Suzhou INVO, MINIEYE, MAXIEYE, Fretech, iMotion, etc. have begun to make efforts in the L2 (or above) passenger vehicle ADAS market.

**MINIEYE:** MINIEYE has secured passenger vehicle projects of BYD and JAC. In March 2021, it was designated by a new energy OEM to conduct a L2+ mass production project. On the basis of Huawei's MDC 210 platform, it adopts a multi-sensor fusion solution with AEB, ACC, LKA, HWP, TJP and other functions. In addition, it is co-developing L0-L3 autonomous driving perception solutions with Xilinx; it is cooperating with SMART on L3 (or above) ADAS.

**MAXIEYE:** In October 2020, MAXIEYE won the domestic L2+ production passenger car model project, providing products based on IFVS - intelligent forward visual perception system, which can realize LKA, LCK, AEB, ACC, TJA, ILC, ELK and other functions. In April 2021, in cooperation with HYCAN (formerly GAC NIO New Energy), MAXIEYE will gradually implement the L3 autonomous driving in high-speed scenarios and the L2+ driving assistance system in open urban roads.

**Business Layout of Major Vision Suppliers in China**

Suppliers	Front view			Surround view	Side view	Rearview	Interior vision
	Monocular	Binocular	Others				
MINIEYE	√		√	√	√		√
Suzhou INVO	√		√	√	√	√	√
JIMU Intelligent	√		√	√	√		√
MAXIEYE	√						
Roaddefend	√		√		√		√
Tsingtech Microvision	√				√		√
CalmCar	√			√	√		√
Autocruis	√			√	√		√
Jingwei Hirain Technologies	√			√			√
WHETRON ELECTRONICS	√		√	√		√	√
OFILM	√			√	√	√	√
Tsintel Technology	√						√
Anzhi-Auto	√						
Streamax Technology	√	√		√	√	√	√
Freetech	√						
iMotion	√						
Smarter Eye		√					√
Sphyrna Technology		√		√		√	
Metoak		√			√		
SINOCHIPAI	√	√					√
Dahua Technology	√	√		√	√		√
Huawei		√		√			
DJI	√	√		√	√	√	√
TungThih Electronic	√		√	√	√	√	
Hangsheng Electronics	√		√	√		√	√
Hikvision	√		√	√	√	√	√
Desay SV	√		√	√			√
Zongmu Tech	√			√		√	
Hefei Softec Auto Electronic	√			√		√	√
oToBrite	√		√	√	√		√
Minth Group	√			√	√	√	√

Source: ResearchInChina

# Table of Content

## 1 Overview of Automotive Vision Industry

- 1.1 Basic Introduction to ADAS
- 1.2 Classification of ADAS functions
- 1.3 Main Application Scenarios of Automotive Cameras in ADAS
- 1.4 Classification of Automotive Cameras
- 1.5 Working Principle and Structure of Automotive Cameras
- 1.6 Cost Structure of Automotive Cameras
- 1.7 Automotive Camera Industry Chain
- 1.8 Layout of Automotive Camera Industry Chain Companies

## 2 Chinese Automotive Vision Market and Trends

- 2.1 Market Overview
  - 2.1.1 China's Passenger Car Camera Configurations, 2019-2025E
  - 2.1.2 China's Passenger Car Camera Installation Rate, 2019-2025E
  - 2.1.3 China's Passenger Car Camera Installations, 2019-2025E
- 2.2 Front View System
  - 2.2.1 China's Passenger Car Front View System Installations and Installation Rate, 2019-2025E
  - 2.2.2 China's Passenger Car Front View System Installations by Month and YoY, 2019-2020
  - 2.2.3 China's Passenger Car Front View System Installation Rate by Month and YoY, 2019-2020
  - 2.2.4 China's Passenger Car Front View System Installations and Installation Rate by Price, 2019-2020
  - 2.2.5 China's TOP15 Passenger Car Brands by Front View System Installations and Installation Rate, 2020
  - 2.2.6 China's TOP20 Passenger Car Models by Front View System, 2020
- 2.3 Surround View System
  - 2.3.1 China's Passenger Car AVS Installations and Installation Rate, 2019-2025

- 2.3.2 China's Passenger Car AVS Installations by Month and YoY, 2019-2020
- 2.3.3 China's Passenger Car AVS Installation Rate by Month and YoY, 2019-2020
- 2.3.4 China's Passenger Car AVS Installations and Installation Rate by Price, 2019-2020
- 2.3.5 China's TOP15 Passenger Car Brands by AVS Installations and Installation Rate, 2020
- 2.3.6 China's TOP20 Passenger Car Models by AVS, 2020
- 2.4 DMS
  - 2.4.1 China's Passenger Car DMS Installations and Installation Rate, 2019-2025E
  - 2.4.2 China's Passenger Car DMS Installations by Month and YoY, 2019-2020
  - 2.4.3 China's Passenger Car DMS Installation Rate by Month and YoY, 2019-2020
  - 2.4.4 China's Passenger Car DMS Installations and Installation Rate by Price, 2019-2020
  - 2.4.5 China's TOP15 Passenger Car Brands by DMS Installations and Installation Rate, 2020
  - 2.4.6 China's TOP20 Passenger Car Models by DMS, 2020
- 2.5 Rearview System
  - 2.5.1 China's Passenger Car Rearview System Installations and Installation Rate, 2019-2025E
  - 2.5.2 China's Passenger Car Rearview System Installations by Month and YoY, 2019-2020
  - 2.5.3 China's Passenger Car Rearview System Installation Rate by Month and YoY, 2019-2020
  - 2.5.4 China's Passenger Car Rearview System Installations and Installation Rate by Price, 2019-2020
  - 2.5.5 China's TOP15 Passenger Car Brands by Rearview System Installations and Installation Rate, 2020
  - 2.5.6 China's TOP20 Passenger Car Models by Rearview System, 2020
- 2.6 Driving Recorder
  - 2.6.1 China's Passenger Car Driving Recorder Installations and Installation Rate, 2019-2025E
  - 2.6.2 China's Passenger Car Driving Recorder Installations by Month and YoY, 2019-2020

# Table of Content

- 2.6.3 China's Passenger Car Driving Recorder Installation Rate by Month and YoY, 2019-2020
- 2.6.4 China's Passenger Car Driving Recorder Installations and Installation Rate by Price, 2019-2020
- 2.6.5 China's TOP15 Passenger Car Brands by Driving Recorder Installations and Installation Rate, 2020
- 2.6.6 China's TOP20 Passenger Car Models by Driving Recorders, 2020
- 2.7 Main Front View System Suppliers
  - 2.7.1 China's New Passenger Car Front View System Suppliers and Market Share
  - 2.7.2 China's New Passenger Car Front View System Supply
- 2.8 Layout of Chinese Vision Enterprises
  - 2.8.1 Overview of Vision Enterprises
  - 2.8.2 Layout of Vision Enterprises
- 2.9 Development Trends of Chinese Vision Market
  - 2.9.1 Policy Drives DMS and Driving Recorder Markets to See Opportunities
  - 2.9.2 Market Demand for Commercial Vehicles Will Increase Substantially
  - 2.9.3 New Models Have Embedded Hardware in Succession, Driving the Increase in the Number of Cameras
  - 2.9.4 A Number of Vision Companies Enter the Passenger Car OEM Market
  - 2.9.5 Mobileye Takes the Lead in the Chinese Front View Chip Market
  - 2.9.6 Front View Cameras Enter the 8-megapixel Era
  - 2.9.7 Huawei and DJI Are Racing to the Domestic Application of Binocular Vision
  - 2.9.8 The "360° Surround View + Ultrasound" Solution Has Become the Mainstream Solution for Integrated Parking
  - 2.9.9 Technology and Policy Accelerate Domestic Visual DMS/OMS

## 3 Chinese Monocular Vision Enterprises

- 3.1 MINIEYE
  - 3.1.1 Profile

- 3.1.2 Products
- 3.1.3 Autonomous Driving Perception Solutions
- 3.1.4 Technology and Partners
- 3.1.5 Competitive Advantages
- 3.2 Suzhou INVO
  - 3.2.1 Profile
  - 3.2.2 Solutions
  - 3.2.3 Camera Module Products
  - 3.2.4 Visual ADAS Products
  - 3.2.5 Partners
- 3.3 JIMU Intelligent
  - 3.3.1 Profile
  - 3.3.2 Products
  - 3.3.3 Vision Products
  - 3.3.4 Vision Product Application
  - 3.3.5 Technology Roadmap
  - 3.3.6 Partners
- 3.4 MAXIEYE
  - 3.4.1 Profile
  - 3.4.2 Products and Function Roadmap
  - 3.4.3 Vision Products
  - 3.4.4 Autonomous Driving Solutions
  - 3.4.5 Self-developed Perception + Control Full Stack System
  - 3.4.6 Partners
- 3.5 Roaddefend
  - 3.5.1 Profile
  - 3.5.2 AI Active Safety Products and Solutions
  - 3.5.3 Products



# Table of Content

- 3.5.4 Solutions for Tourist Chartered Buses, Buses between Non-Adjacent Counties, and Special Road Vehicles for Transporting Dangerous Chemicals, Fireworks, Firecrackers and Civilian Explosives
- 3.5.5 Product Application
- 3.5.6 Core Technology
- 3.5.7 Major Customers
- 3.6 Freetech
  - 3.6.1 Profile
  - 3.6.2 Vision Products
  - 3.6.3 ADAS Solutions
  - 3.6.4 Autonomous Driving Solutions
  - 3.6.5 Customers and Partners
- 3.7 Tsingtech Microvision
  - 3.7.1 Profile
  - 3.7.2 Autonomous Driving Technology Solutions
  - 3.7.3 Main Products
- 3.8 CalmCar
  - 3.8.1 Profile
  - 3.8.2 Core Products
  - 3.8.3 Products
  - 3.8.4 Vision ADAS
  - 3.8.5 Partners
- 3.9 Autocruis
  - 3.9.1 Profile
  - 3.9.2 Products
  - 3.9.3 Product Function Evolution
  - 3.9.4 Product Platform Evolution
  - 3.9.5 Core Technology
  - 3.9.6 Market Positioning

- 3.9.7 Partners
- 3.10 Jingwei Hirain Technologies
  - 3.10.1 Profile
  - 3.10.2 Development History
  - 3.10.3 Supporting Automotive Electronic Products
  - 3.10.4 Supporting Electronic Products - Intelligent Driving
  - 3.10.5 Front View Active Safety Camera (FAS-Cam)
  - 3.10.6 DMS Cameras and Others
  - 3.10.7 APA Automatic Parking System
  - 3.10.8 Major Customers
- 3.11 OFILM
  - 3.11.1 Profile
  - 3.11.2 Main Business Groups
  - 3.11.3 Development History
  - 3.11.4 Automotive Camera Layout
  - 3.11.5 Intelligent Automotive Business
  - 3.11.6 Vision Products
  - 3.11.7 Development Plan
- 3.12 Streamax Technology
  - 3.12.1 Profile
  - 3.12.2 Products
  - 3.12.3 ADAS System
  - 3.12.4 DMS
  - 3.12.5 BSD System
  - 3.12.6 Face Recognition Technology
  - 3.12.7 Solutions
- 3.13 Tsintel Technology
  - 3.13.1 Profile
  - 3.13.2 ADAS System

# Table of Content

- 3.13.3 L4 Autonomous Driving at Specific Scenarios
- 3.13.4 Partners
- 3.13.5 Dynamics
- 3.14 iMotion
- 3.14.1 Profile
- 3.14.2 Vision Products
- 3.14.3 Partners
- 3.15 Anzhi-Auto
- 3.15.1 Profile
- 3.15.2 Anzhi i-Camera
- 3.15.3 Anzhi i-Fusion Sensor Integrated System
- 3.15.4 Dynamics
- 3.16 Whetron Electronics
- 3.16.1 Profile
- 3.16.2 Automotive Vision Products
- 3.16.3 Dynamics

## **4 Chinese Binocular Vision Enterprises**

- 4.1 Smarter Eye
- 4.1.1 Profile
- 4.1.2 Products
- 4.1.3 Product Development
- 4.1.4 Comparison of Similar Products
- 4.1.5 Binocular Product Application and Cooperation
- 4.1.6 Manufacturing
- 4.2 Sphyrna Technology
- 4.2.1 Profile
- 4.2.2 Products
- 4.3 Metoak

- 4.3.1 Profile
- 4.3.2 Products
- 4.3.3 Automotive Solutions
- 4.3.4 Core Technology
- 4.3.5 Product Application
- 4.4 Huawei
- 4.4.1 Intelligent Automotive Vision Solutions
- 4.4.2 8M Front View Camera and Super Fisheye
- 4.4.3 Vision Product Application Cases
- 4.5 DJI
- 4.5.1 Profile
- 4.5.2 Automotive Vision Perception Products
- 4.5.3 Automotive Binocular Vision Perception Technology
- 4.5.4 Autonomous Driving Solutions
- 4.6 SINOCHIPAI
- 4.6.1 Profile
- 4.6.2 Development History
- 4.6.3 Products
- 4.6.4 Core Technology
- 4.6.5 Partners
- 4.7 Dahua Technology
- 4.7.1 Profile
- 4.7.2 Vision Products
- 4.7.3 Binocular Application
- 4.7.4 Binocular Dynamics

## **5 Other Vision Enterprises**

- 5.1 TungThih Electronic
- 5.1.1 Profile

# Table of Content

5.1.2 Global Layout and Product Layout	5.6.3 Core Technology
5.1.3 Vision Products	5.6.4 Camera Products
5.1.4 Main Products and Customers	5.6.5 Automatic Parking System
5.2 Hangsheng Electronics	5.6.6 Customers and Partners
5.2.1 Profile	5.7 Minth Group
5.2.2 Product System	5.7.1 Profile
5.2.3 ADAS Product Series	5.7.2 Revenue and Structure
5.2.4 Suppliers	5.7.3 Camera Business Development
5.2.5 Customers	5.7.4 Camera Products
5.2.6 Cooperation	5.7.5 ADAS Product Application
5.3 Hikvision	5.8 Hefei Softec Auto Electronic
5.3.1 Profile	5.8.1 Profile
5.3.2 Automotive Electronic Products	5.8.2 Main Camera Products
5.3.3 Vision Products	5.8.3 Automotive Surround View System
5.3.4 Automotive Solutions	
5.4 Desay SV	
5.4.1 Profile	
5.4.2 Intelligent Driving Business and Products	
5.4.3 HD Surround View System Application Cases	
5.4.4 Fully Autonomous Parking System Application Cases	
5.4.5 Major Customers	
5.5 Zongmu Tech	
5.5.1 Profile	
5.5.2 Camera Products	
5.5.3 Autonomous Parking System	
5.5.4 Major Customers	
5.6 oToBrite	
5.6.1 Profile	
5.6.2 ADAS Products	



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