

### Automotive Domain Control Unit (DCU) Industry Report, 2019-2020

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#### STUDY GOAL AND OBJECTIVES

This report provides the industry executives with strategically significant competitor information, analysis, insight and projection on the competitive pattern and key companies in the industry, crucial to the development and implementation of effective business, marketing and R&D programs.

#### **REPORT OBJECTIVES**

- To establish a comprehensive, factual, annually updated and costeffective information base on market size, competition patterns, market segments, goals and strategies of the leading players in the market, reviews and forecasts.
- To assist potential market entrants in evaluating prospective acquisition and joint venture candidates.
- To complement the organizations' internal competitor information gathering efforts with strategic analysis, data interpretation and insight.
- To suggest for concerned investors in line with the current development of this industry as well as the development tendency.
- To help company to succeed in a competitive market, and

#### **METHODOLOGY**

Both primary and secondary research methodologies were used in preparing this study. Initially, a comprehensive and exhaustive search of the literature on this industry was conducted. These sources included related books and journals, trade literature, marketing literature, other product/promotional literature, annual reports, security analyst reports, and other publications. Subsequently, telephone interviews or email correspondence was conducted with marketing executives etc. Other sources included related magazines, academics, and consulting companies.

#### **INFORMATION SOURCES**

The primary information sources include Company Reports, and National Bureau of Statistics of China etc.

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### Abstract

#### Domain control unit shipments will boom in 2021.

When the one-to-one correspondence between the growing number of sensors and electronic control units (ECU) leads to underperforming vehicles and adds circuit complexity, more powerful centralized architectures like domain control unit (DCU) and multi-domain controller (MDC) come as an alternative to the distributed ones.

As concerns the tendency of domain controller, Vector conceives three stages of E/E architecture development: controller-centric, DCU, and central computer. Intelligent vehicle will ultimately be a mobile super computer and data center, and a new Wintel will come into being. In future, computing platform, operating system and application software will matter the most to the highly automated vehicles; multimedia multi-domain controllers and central domain controllers are likely to be combined into one.



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In response to the disruption, Volkswagen plans adoption of a unified automotive E/E architecture; BMW will introduce central communication services and service-oriented architecture (SOA) in its next-generation E/E architecture; the smart vehicle architecture (SVA) launched by Aptiv breaks the bottleneck of conventional architectures, providing frame scalability for next-generation intelligent vehicles. The new E/E architectures will be built on the concept of central computer-layer-area, embodying the philosophy of SOA.

As to DCU, next-generation smart cockpit system based on cockpit DCU enables functionality of cockpit electronic system on a unified software and hardware platform. Cockpit electronic system offering intelligent interaction and scenarios as well as personalized services, will be a foundation for human-vehicle interaction and vehicle-to-everything (V2X) communication. Visteon argues that by 2023, intelligent cockpit integrated with LCD dashboard, center console and co-pilot infotainment system will be based entirely on single-ECU domain control platform.

Globally, Visteon, Continental, Bosch and Aptiv dominate the cockpit DCU market; Chinese players like Huawei, Desay SV, Shenzhen Hangsheng Electronics and Neusoft race to unveil their cockpit DCU solutions.

As for cockpit chip, typical products are comprised of Qualcomm 820A, Intel Atom, NXP i.MX8, Renesas R-CAR H3 and TI Jacinto family. Notably, the prevailing Qualcomm 820A processor platform has been ordered by 18 out of the 25 world-renowned OEMs, with the order intake recording \$5.5 billion or so.

In the ADAS/AD DCU market, most of those in use for Level 1 driving assistance employ separate ECU to control. ADAS ECU which is developed mainly for Level 2 driving assistance is utilized to combine LDW/LKA and AEB. It is in the era of Level 2+, Level 3 and Level 4 automated driving that the demand for autonomous driving domain control unit (AD DCU) will be soaring.

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### Solutions and Customers of Typical Cockpit DCU Vendors

Vendor	Computing Platform	Cockpit DCU	Cockpit DCU Clients
Visteon	Qualcomm	SmartCore	Daimler-Benz A Class (2018) Geely (2021) GAC Aion LX (2020) Dongfeng Tata (Spawned)
Continental	Qualcomm/Renesas	Integrated Interior Platform (IIP)	1
Bosch	Qualcomm	Al car computer	GM, Ford
Aptiv	Intel	Integrated cockpit controller (ICC)	Great Wall Motor, Audi, Ferrari, Volvo
Denso	Qualcomm	Harm <mark>ony</mark> Core™	Toyota (Subaru Legacy 2020 & Outlook 2020)
Faurecia Clarion	Renesas R-Car H3	Cockpit Intelligence Platform (CIP)	BMW/VW
Panasonic	Qualcomm3rd-generationprocessorSnapdragon8155/6155	SPYDR 3.0	,
Huawei	Automotive Kirin chip	CDC Intelligent Cockpit Platform	New Baojun RC-6 (2020)
Desay SV	Qualcomm 820A TI J6	Intelligent cockpit DCU	Leading Ideal, ENOVATE
Shenzhen Hangsheng Electronics	NXP i.MX 8 QuadMax	Intelligent cockpit DCU	Dongfeng Venucia
Shenzhen CooKoo Technology	NXP i.MX8QM	DCU ACU202	Several OEMs
Neusoft	Intel, Qualcomm	C4-Alfus/C4-Pro	Hongqi, EXEED LX

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Tier-1 suppliers worldwide already deploy ADAS/AD DCU such as Visteon DriveCore, Bosch DASy, Continental ADCU, ZF ProAI, Veoneer Zeus and Magna MAX4. In China, such typical products include iECU (co-developed by SAIC and TTTech), Huawei MDC (MobileData Center) intelligent driving DCU, IN-DRIVING TITAN, and Neusoft Reach CPDC-II DCU/CPDC-III central computer.

When it comes to autonomous driving chip, Nvidia is absolutely the leader with Nvidia Drive PX2 and Nvidia Drive Xavier being widely deployed by vendors. In December 2019, Nvidia introduced DRIVE AGX Orin, a software-defined platform for Level 5 automated driving, with nearly 7x the performance of the previous generation SoC Xaiver. The Orin SoC integrates NVIDIA's next-generation GPU architecture and Arm Hercules CPU cores, as well as new deep learning and computer vision accelerators that, in aggregate, deliver 2,000 TOPS.

	Orin	Xavier
L5	2 Orins+2 GPU	2 Xaviers +2 GPUs
	2,000 TOPS	320 TOPS
	750W	460W
	2.67 TOPS/W	0.7 TOPS/W
L3	2 Orins	Xavier+GPU
	400 TOPS	160 TOPS
	130W	230W
	3.08 TOPS/W	0.7 TOPS/W
	Orin 4-Camera	Xavier
	100 TOPS	30 TOPS
	40W	30W
	2.5 TOPS/W	1 TOPS/W
L2		
	Orin S 1-Camera	ADAS Chip+CUP
	36 TOPS	
	15 W	
	2.4 TOPS/W	
SOP	2022	2020

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Other autonomous driving chips include TI TDA4, Qualcomm? Snapdragon Ride?, NXP S32 family, and Mobileye EyeQ family.

Vendor	DCU Platform	Computing Platform	Level of Automated Driving	Computing Power	ASIL	Operating System	Customer and Mass-production Plan	
Visteon	DriveCore	Support processor architectures of Nvidia, NXP and Qualcomm	L2-L4	-	ASIL D	Autosar, Adaptive Autosar POSIX OS	<ul> <li>L3 Drive Core A sample DCU for GAC project has been developed and will be spawned in 2021 as scheduled.</li> <li>Projects for 2 European OEMs will undergo SOP during 2022-2023 as scheduled.</li> </ul>	
Continental	In-car application server (ICAS1)	Nvidia	L2	2.7-19 DMIPs	ASIL C/D	Autosar,	MEB platform-based Volkswagen ID.3 BEV will go into mass production in 2020.	
	ADCU	Nvidia DRIVE E XavierTM	L3/L4	274 DMIPs	ASIL D	Adaptive Autosar	L3 DCU co-developed with Nvidia will be spawned in 2021 as scheduled.	
Bosch	DASy 1.0 base		L2	3 DMIPs	ASIL C/D	Autosar classic	• SOP in 2019	
	DASy 1.0 mid	Nvidia	L2	10 DMIPs	ASIL C/D	Autosar	• SOP in 2019	
	DASy 1.0 high	Invidia	L2+	14-34 DMIPs	ASIL C/D	classic + Adaptive POSIX OS	SOP in 2019, supporting L2+ capabilities (e.g., HWA and TJP)	
	DASy 2.0	Nvidia DRIVE E XavierTM	L3/L4	260 DMIPs 300 TOPs	ASIL D	Autosar, Adaptive	• SOP in 2022	
	DASy + Cloud	Drive PX Peg asus AI (dual Xavie)	L5	500 DMIPs >300 TOPs	ASIL D	POSIX OS Al	• SOP in 2025	

Typical ADAS/AD DCU Vendors and Their Solutions and SOP Plans

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In the next three to five years, among DCU market segments, cockpit DCU will see a faster growth rate and a larger market than autonomous driving DCU because it is easier to spawn cockpit DCUs at lower cost; the surging demand for intelligent cockpits, which is fueled by the availability of 5G in vehicles, will drive up cockpit DCU shipments to explode in 2021 on the basis of OEM's and Tier1's progress in mass production.

In the ADAS/AD DCU field, inadequate regulations and immature technologies will expectedly make it hard to apply Level 3/Level 4 automated driving technologies on large scale in the upcoming three to five years. OEMs, tier-1 suppliers and chip vendors are working to mass produce L2+ autonomous vehicles. It is predicted that production of Level 3/Level 4 autonomous vehicles will peak around 2025, but business-oriented vehicles will play the key role, with roughly 5 million units of ADAD/AD DCUs for passenger cars to be shipped worldwide in 2025.

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### Table of contents

#### 1 ECU to DCU

#### 1.1 ECU

- 1.1.1 Definition of ECU
- 1.1.2 Typical Block Diagram of Automotive Electronics Control Circuit
- 1.1.3 Automotive ECU Industry Chain
- 1.1.4 Development of ECU
- 1.1.5 ECUs Increase and DCU Debuts

#### 1.2 DCU

- 1.2.1 Definition of DCU
- 1.2.2 Five Typical DCUs
- 1.2.3 Why to Use DCUs
- 1.2.4 Main Functions of DCU
- 1.2.5 Development Trends of DCU
- 1.2.6 DCU Ecosystem
- 1.2.7 Global Passenger Car DCU (Cockpit + Autonomous Driving) Market Size
- 1.2.8 High Performance SoC Processors Boost DCU Market

#### 2 Automotive Electronic/Electrical Architecture (EEA)

- 2.1 Development Trends of EEA
- 2.1.1 Evolution of EEA
- 2.1.2 Development Trends of EEA
- 2.1.3 Three Stages of Future EEA Development

- 2.1.4 Integration Trends of EEA
- 2.1. Development Trends of New-EEA-based Intelligent Vehicles
- 2.1.6 Core Technologies for Redefined Intelligent Vehicle (1)
- 2.1.7 Core Technologies for Redefined Intelligent Vehicle (2)
- 2.1.8 Core Technologies for Redefined Intelligent Vehicle (3)
- 2.1.9 Core Technologies for Redefined Intelligent Vehicle (4)
- 2.1.10 Core Technologies for Redefined Intelligent Vehicle (5)
- 2.1.11 Core Technologies for Redefined Intelligent Vehicle (6)
- 2.2 Development Trends of Tier1's EEA
- 2.2.1 Bosch EEA Evolution Strategy
- 2.2.2 Bosch Intelligent Vehicle Multi-domain Architecture
- 2.2.3 Aptiv Smart Vehicle Architecture (SVA)
- 2.2.4 Aptiv EEA Evolution Strategy
- 2.2.5 Continental Distributed EEA
- 2.2.6 NXP Next-generation EEA

2.3 Development Trends of OEM's EEA

#### 3 Intelligent Cockpit DCU

- 3.1 Development Trends of Intelligent Cockpit DCU
- 3.1.1 3 ECUs in a Convectional Cockpit System can be Integrated into an Intelligent Cockpit DCU
- 3.1.2 Cockpit Domains before and after 2020
- 3.1.3 Example of Complex Intelligent Cockpit DCU Design

#### The Vertical Portal for China Business Intelligence

### Table of contents

- 3.1.4 Visteon's Prediction of Intelligent Cockpit DCU Market
- 3.2 Intelligent Cockpits and DCU Solutions
- 3.2.1 Comparison between Main Foreign Cockpit Platform Solutions
- 3.2.2 Comparison between Main Cockpit Platform Solutions in China
- 3.2.3 Solutions and Customers of Typical Cockpit DCU Vendors
- 3.2.4 Main Automotive Intelligent Cockpit Platforms of OEMs and Their Suppliers Worldwide
- 3.3 Intelligent Cockpit Processors
- 3.3.1 Mainstream Intelligent Cockpit Processors in Current Market
- 3.3.2 Qualcomm Cockpit Processors
- 3.3.3 Qualcomm Snapdragon Cockpit Processors
- 3.3.4 Renesas Cockpit Processors
- 3.3.5 Intel Cockpit Processors
- 3.3.6 NXP Cockpit Processors
- 3.3.7 TI Cockpit Processors
- 3.3.8 Samsung Cockpit Processors
- 3.3.9 Allwinnertech Technology's Cockpit Processors
- 3.3.10 MediaTek Cockpit Processors
- 3.3.11 Horizon Robotics' Cockpit Processors

#### 4 ADAS/AD DCUs and Chips

- 4.1 Development Trends of ADAS/AD DCU
- 4.1.1 ADAS Distributed ECU and ADAS/AD DCU
- 4.1.2 Overview of ADAS/AD DCU
- 4.1.3 Visteon's Prediction of ADAS/AD DCU Market
- 4.1.4 Typical Architecture Solutions of ADAS/AD DCU
- 4.1.5 Development Trends of Autonomous Driving DCU

#### 4.2 ADAS/AD DCU Solutions

- 4.2.1 Typical ADAS/AD DCUs (13)
- 4.2.2 List of Foreign Vendors' Layout of ADAS/AD DCU (1)
- 4.2.3 List of Foreign Vendors' Layout of ADAS/AD DCU (2)
- 4.2.4 List of Foreign Vendors' Layout of ADAS/AD DCU (3)
- 4.2.5 List of Chinese Vendors' Layout of ADAS/AD DCU (1)
- 4.2.6 List of Chinese Vendors' Layout of ADAS/AD DCU (2)
- 4.2.7 Main Automakers' ADAS/AD DCU Platforms and Suppliers Worldwide
- 4.3 ADAS/AD DCU Chips
- 4.3.1 DCU Chip Vendor: NVIDIA
- 4.3.1.1 NVIDIA Drive Ecosystem
- 4.3.1.2 NVIDIA Drive Autonomous Driving Chip Portfolios
- 4.3.1.3 NVIDIA Software-defined Automotive Platform
- 4.3.1.4 NVIDIA's Technology Cooperation

#### The Vertical Portal for China Business Intelligence

### Table of contents

- 4.3.2 DCU Chip Vendor: TI
- 4.3.2.1 TI Autonomous Driving Chip Architecture
- 4.3.2.2 TI Launched New Chips for ADAS
- 4.3.2.3 TI Autonomous Driving Chips
- 4.3.3 DCU Chip Vendor: Renesas
- 4.3.3.1 Renesas R-Car
- 4.3.3.2 Renesas Autonomous Driving Chips
- 4.3.3.3 Renesas L4 Computing Platform Architecture
- 4.3.3.4 Renesas Autonomy Platform
- 4.3.4 DCU Chip Vendor: Qualcomm
- 4.3.5 NXP DCU Chip Vendor: NXP
- 4.3.5.1 Application of NXPS32 Family Product Lines
- 4.3.5.2 NXPS32 Family: Based on ARM Cores
- 4.3.5.3 NXPS32 Family: Applied in ADAS and Autonomous Driving
- 4.3.5.4 NXPS32 Family: Chip Technology Roadmap
- 4.3.5.5 NXP Launched Next-generation S32 Computing Platform
- 4.3.5.6 NXP Autonomous Driving Computing Platform: Bluebox
- 4.3.5.7 NXP Bluebox Roadmap
- 4.3.5.8 Cooperation with Kalray
- 4.3.5.9 NXP's Opinions on Automotive Electronics Evolution

- 4.3.6 DCU Chip Vendor: Intel
- 4.3.6.1 IntelGo
- 4.3.6.2 Mobileye EyeQ Family Product Roadmap
- 4.3.6.3 Mobileye EyeQ5 Product Progress
- 4.3.6.4 Integration between Mobileye EyeQx Product Lines and INTEL System
- 4.3.6.5 Total Shipments of Mobileye EyeQ Family Chips, 2014-2019

#### 4.3.7 Horizon Robotics

- 4.3.7.1 Autonomous Driving Processors
- 4.3.7.2 Performance Parameters of Chips
- 4.3.7.3 Autonomous Driving Computing Platform
- 4.3.7.4 Automotive-grade AI Chip Customers
- 4.3.8 Other Chips for DCU
- 4.3.8.1 ARM Autonomous Driving Safety Processors
- 4.3.8.2 ARM Autonomous Driving Cores
- 4.3.8.3 ARM Industrial Cooperation
- 4.3.8.4 Infineon Multi-core Microcontrollers (1)
- 4.3.8.5 Infineon Multi-core Microcontrollers (2)
- 4.3.8.6 Xilinx FPGA
- 4.3.8.7 Application of Xilinx FPGA in Autonomous Driving and Industrial Cooperation
- 4.3.8.8 Xilinx Marched in ADAS/AD Market
- 4.3.8.9 Customers and Partners

#### The Vertical Portal for China Business Intelligence

### Table of contents

#### **5 Foreign DCU Vendors**

- 5.1 Visteon
- 5.1.1Profile
- 5.1.2 Product Lines
- 5.1.3 Development Plan for Cockpit Electronics and Autonomous Driving
- 5.1.4 Business Progress Worldwide, 2019
- 5.1.5 Business Progress in China, 2019
- 5.1.6 DCU Business Progress and Expectation, 2019
- 5.1.7 Autonomous Driving Platform
- 5.1.8 Progress in Autonomous Driving Business, 2018
- 5.1.9 Progress in Autonomous Driving Business, 2019
- 5.1.10 Intelligent Cockpit DCU
- 5.1.11 Cockpit DCU Application Cases
- 5.2 Continental
- 5.2.1 Profile
- 5.2.2 Business Progress Worldwide, 2019
- 5.2.3 Layout of Autonomous Driving Product Lines
- 5.2.4 Autonomous Driving DCUs
- 5.2.5 Computing Power of Autonomous Driving DCU Chips
- 5.2.6 Development Plan for Automotive High Performance Computer Platform
- 5.2.7 Autonomous Driving DCU Partners
- 5.2.8 Cockpit DCUs

#### 5.2.9 Security DCUs

#### 5.3 Bosch

- 5.3.1 Business Progress Worldwide, 2019
- 5.3.2 Layout of Autonomous Driving Product Lines
- 5.3.3 Prediction of Next-generation Automotive Architecture Evolution
- 5.3.4 Intelligent Vehicle Multi-domain Architecture
- 5.3.5 Mixed Framework of ECU for Domain Classification
- 5.3.6 Autonomous Driving DCU Technology Roadmap
- 5.3.7 Performance Parameters of Autonomous Driving DCU Products
- 5.3.8 Development Plan for Autonomous Driving DCU
- 5.3.9 Development Plan for Computing Power of Autonomous Driving DCU
- 5.3.10 Comparison of Autonomous Driving DCUs between Bosch and Its Counterparts
- 5.3.11 Autonomous Driving Software Architecture (1)
- 5.3.12 Autonomous Driving Software Architecture (2)
- 5.3.13 Intelligent Cockpit Domain Architecture (1)
- 5.3.14 Intelligent Cockpit Domain Architecture (2)
- 5.3.15 Intelligent Cockpit Software R&D Partners

5.4 Veoneer

- 5.4.1 Business Progress, 2019
- 5.4.2 Layout of Autonomous Driving Product Lines

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#### The Vertical Portal for China Business Intelligence

### Table of contents

- 5.4.3 Active Safety Platform Architecture and Development Strategy
- 5.4.4 ADAS Controllers
- 5.4.5 ADAS/AD ECU
- 5.4.6 Functional Architecture of ADAS/AD ECU
- 5.4.7 Autonomous Driving Software Development
- 5.4.8 New Products Plan, 2019

#### 5.5 ZF

- 5.5.1 Business Progress and Revenue Structure, 2019
- 5.5.2 Autonomous Driving DCU Product Plan
- 5.5.3 Progress in Application of Autonomous Driving DCU in China
- 5.5.4 Latest-generation Autonomous Driving DCUs
- 5.5.5 Development Roadmap and Mass-production Plan for Autonomous Driving DCU
- 5.5.6 Mass-production Plan for L2.5 Automated Driving Solutions
- 5.5.7 L4 Automated Driving Partners
- 5.5.8 Cooperation with Xilinx
- 5.5.9 Cooperation with Microsoft

#### 5.6 Aptiv

- 5.6.1 Business Progress, 2019
- 5.6.2 Organizational Structure Adjustment
- 5.6.3 New Strategic Position
- 5.6.4 Intelligent Vehicle Architecture Design
- 5.6.5 Intelligent Vehicle Architecture Design: Features

- 5.6.6 Intelligent Vehicle Architecture Design: Topology
- 5.6.7 Intelligent Vehicle Architecture Design: Challenges for Development and Production
- 5.6.8 Intelligent Vehicle Architecture Design: Software-defined Platform
- 5.6.9 Intelligent Vehicle Architecture Design: Technological Strengths
- 5.6.10 Autonomous Driving Computing Platform
- 5.6.11 Cooperation with Others on DCU Development
- 5.6.12 Intelligent Cockpit DCUs
- 5.7 Magna
- 5.7.1 Business Progress, 2019
- 5.7.2 Autonomous Driving Product Lines
- 5.7.3 Autonomous Driving Platform DCUs
- 5.7.4 Features of Autonomous Driving Platform DCU
- 5.7.5 Launch of Highly Integrated Autonomous Driving Development Platform
- 5.8 Tesla Autonomous Driving Platform
- 5.8.1 Autopilot: Hardware Development Roadmap
- 5.8.2 Autopilot: Function Upgrade Path
- 5.8.3 Autopilot: Software Upgrade Path
- 5.8.4 Features of DCU (1)
- 5.8.5 Features of DCU (2)
- 5.8.6 Features of DCU (3)

#### The Vertical Portal for China Business Intelligence

### Table of contents

- 5.8.7 Features of DCU (4)
- 5.8.8 Features of DCU (5)
- 5.8.9 New ECU Architecture
- 5.8.10 ECU Motherboards for Multimedia and Autonomous Driving
- 5.8.11 Tesla Model 3 Central Computing Modules
- 5.8.12 AutoPilot 3.0 Chip
- 5.9 TTTech
- 5.9.1 Profile
- 5.9.2 Autonomous Driving Solutions
- 5.9.3 Cooperation with Others on Development of Autonomous Driving DCUs
- 5.9.4 Technological Strengths of Autonomous Driving DCU Platform
- 5.9.5 Autonomous Driving Safety Software Platform
- 5.9.6 Cooperation with SAIC

#### 5.10 Faurecia

- 5.10.1 Faurecia's Business Progress, 2019
- 5.10.2 Business Progress of Faurecia Clarion Electronics, 2019
- 5.10.3 Global Presence of Faurecia Clarion Electronics
- 5.10.4 Product Lines of Faurecia Clarion Electronics
- 5.10.5 Ecosystem of Faurecia Clarion Electronics
- 5.10.6 Faurecia's Next-generation Cockpit Intelligence Platform (CIP)
- 5.10.7 Faurecia's Cockpit Strategic Layout

- 5.10.8 Faurecia Steps up Deployment of Its Intelligent Cockpit Strategy in China
- 5.11 Panasonic
- 5.11.1 Cockpit DCU Solutions
- 5.11.2 Cockpit Electronics Layout
- 5.11.3 Cockpit Electronics Computing Architecture

#### 6 Chinese DCU Vendors

- 6.1 Huawei
- 6.1.1 Autonomous Driving Computing Platform
- 6.1.2 Intelligent Vehicle Development Strategy
- 6.1.3 Framework of MDC Autonomous Driving Computing Platform
- 6.1.4 Overall Architecture of MDC Autonomous Driving Computing Platform
- 6.1.5 MDC Autonomous Driving Software Platform and Software Development Kits
- 6.1.6 MDC Autonomous Driving Computing Platform Passed Automotive Certification of TUV
- 6.1.7 CDC Intelligent Cockpit Platform
- 6.2 Baidu
- 6.2.1 Baidu Autonomous Driving Brain (1)
- 6.2.2 Baidu Autonomous Driving Brain (2)
- 6.2.2 Baidu Autonomous Driving Brain (3)

#### The Vertical Portal for China Business Intelligence

### Table of contents

- 6.2.3 Autonomous Driving Computing Platform—Baidu Computing Unit (BCU)
- 6.2.4 BCU: Product Partners
- 6.2.5 BCU: Performance Parameters of Products
- 6.2.6 Autonomous Driving DCU Product Roadmap
- 6.3 Desay SV
- 6.3.1 Strategic Layout
- 6.3.2 Intelligent Cockpit Product Lines and Customers
- 6.3.3 Intelligent Cockpit Products
- 6.3.4 Cooperation with Intelligent Cockpit Customers (1)
- 6.3.5 Cooperation with Intelligent Cockpit Customers (2)
- 6.3.6 Autonomous Driving DCU Partners
- 6.3.7 Participation in Apollo
- 6.3.8 Autonomous Driving Business Layout
- 6.3.9 Highway Pilot and AVP Solution
- 6.4 IN-DRIVING
- 6.4.1 Profile
- 6.4.2 Latest-generation Autonomous Driving DCUs
- 6.4.3 Autonomous Driving DCUs
- 6.4.4 Commercial Use of Autonomous Driving DCUs
- 6.4.5 Cooperation with Huawei
- 6.4.6 DCU Product Roadmap
- 6.5 iMotion
- 6.5.1 Profile
- 6.5.2 Central DCU

- 6.6 HiRain Technologies6.6.1 ADAS DCUs6.6.2 Body DCU Architecture
- 6.7 Neusoft & Neusoft Reach
- 6.7.1 Neusoft's Layout of Intelligent Connected Vehicle
- 6.7.2 Neusoft Reach's Software-defined Computing (SDC) Solutions
- 6.7.3 Neusoft Reach's SDC Core Platform
- 6.7.4 Neusoft Reach NeuSAR 2.0 and Universal DCUs
- 6.7.5 Neusoft Reach's Autonomous Driving DCU Partners
- 6.7.6 Features of Neusoft Reach's Autonomous Driving DCU
- 6.7.7 Neusoft's Intelligent Cockpit Platform Partners
- 6.7.8 Neusoft's Vehicle Computing Platform (VCP)

6.8 Hong Jing Drive6.8.1 Autonomous Driving DCUs6.9.2 Autonomous Driving DCU Tachaologue Dec

6.8.2 Autonomous Driving DCU Technology Roadmap

6.9 Hangsheng Electronics
6.9.1 Product Layout
6.9.2 Intelligent Cockpit Ecosystem
6.9.3 Intelligent Cockpit Rapid Iteration Capability
6.9.4 Intelligent Cockpit Customers
6.10 CooKoo Technology

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