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 cost-effective 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

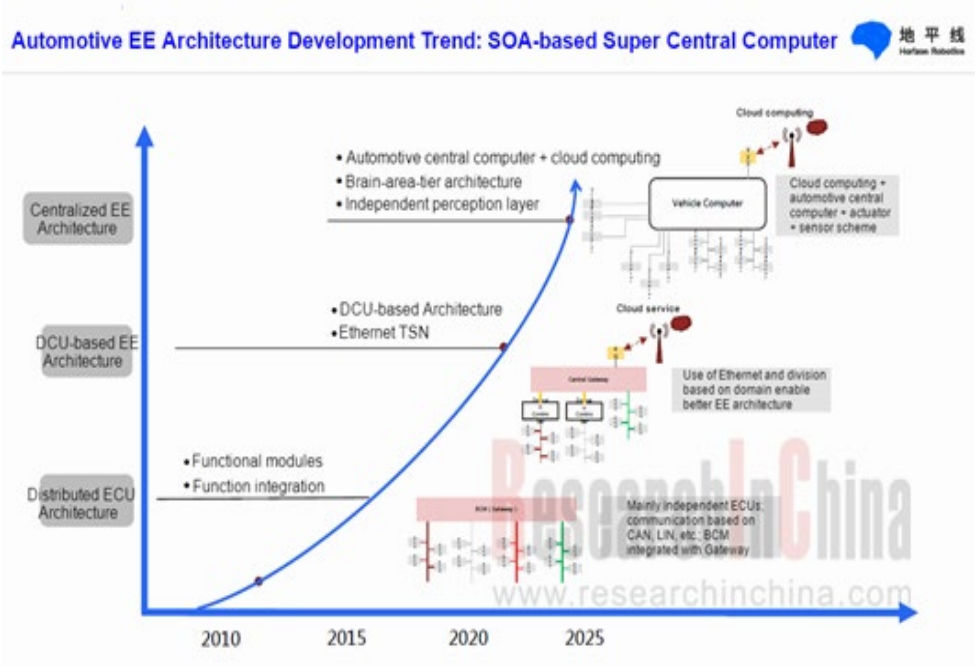
The primary information sources include Company Reports, and National Bureau of Statistics of China etc.

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.



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.

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)	/
Bosch	Qualcomm	AI car computer	GM, Ford
Aptiv	Intel	Integrated cockpit controller (ICC)	Great Wall Motor, Audi, Ferrari, Volvo
Denso	Qualcomm	Harmony Core™	Toyota (Subaru Legacy 2020 & Outlook 2020)
Faurecia Clarion	Renesas R-Car H3	Cockpit Intelligence Platform (CIP)	BMW/VW
Panasonic	Qualcomm 3rd-generation processor Snapdragon 8155/6155	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

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

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

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

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	• L3 Drive Core A sample DCU for GAC project has been developed and will be spawned in 2021 as scheduled. • Projects for 2 European OEMs will undergo SOP during 2022-2023 as scheduled.
Continental	In-car application server (ICAS1)	Nvidia	L2	2.7-19 DMIPs	ASIL C/D	Autosar, Adaptive 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		• L3 DCU co-developed with Nvidia will be spawned in 2021 as scheduled.
Bosch	DASy 1.0 base	Nvidia	L2	3 DMIPs	ASIL C/D	Autosar classic	• SOP in 2019
	DASy 1.0 mid		L2	10 DMIPs	ASIL C/D	Autosar classic + Adaptive POSIX OS	• SOP in 2019
	DASy 1.0 high		L2+	14-34 DMIPs	ASIL C/D		• 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 Autosar POSIX OS AI	• SOP in 2022
	DASy + Cloud	Drive PX Pegasus AI (dual Xavie)	L5	500 DMIPs >300 TOPs	ASIL D		• SOP in 2025

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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