ResearchInChina
www.researchinchina.com

Global and China Automotive Operating System (OS) Industry Report, 2022

Jan.2023

Basic operating system: foreign providers refine and burnish functions; Chinese providers expand software and hardware cooperation.

Internationally, Blackberry's QNX, Linux-based custom operating system, and Android open source project-based operating system are still the three major basic operating systems. In 2022, centering on the benefits of their own products, the three major providers, Blackberry, Intel & Linux Foundation, and Google, play to their strengths, and vigorously expand ecosystem cooperation with OEMs in more aspects: QNX works hard on software and hardware hybrid high-performance computing platforms to facilitate development of "software-defined vehicles"; Intel & Linux Foundation, and Google expanded the cooperation with Chinese and European OEMs, respectively.

In China, Alibaba's AliOS and Huawei's HarmonyOS focusing on autonomous driving and intelligent cockpit, separately, upgrade underlying operating systems ecologically, and join hands with hardware suppliers to create cooperative software-hardware platforms and launch smart mobilOity system solutions.

The Latest Developments of Major Basic Operating System Providers

Type	Provider	Product	Merits	Latest Development
Foreign	Blackberry	QNX	Good real-time performance, high security, non-interference, easy to operate	Develop middleware and high performance computing platform
	Intel & Linux Foundation	Linux	Open source, high flexibility in custom development, high portability	Attract Asian OEMs to join the alliance
	Google	AAOS	Open source, large-scale ecosystem	Pioneer OS integration with new models of European OEMs
Chinese	Alibaba	AliOS	Large-scale ecosystem	Based on intelligent cockpit, begin to enter intelligent driving, and promote the coordinated development of independent operating system and chip software and hardware
	Huawei	Harmony OS	Technology architecture	Cooperate with OEMs to launch intelligent IVI system integrated solutions

Source: ResearchInChina

General operating system: Chinese providers develop diversified functions and create "system + hardware" ecosystems.

In China, the general operating system is oriented to infotainment and intelligent cockpit, and highlights the abundance of ecological resources, and the diversity of services and applications, meeting the individual needs of users, and building ecosystems. Most Chinese general operating systems are developed on Android. The 10 key Chinese providers in this report start with intelligent scene perception and intelligent cockpit, and team up with hardware suppliers to introduce system solutions of "domestic operating system + domestic chip". They also promote custom development of tools such as SDK and software computing platforms, allowing for secondary development in the fields of intelligent cockpit and autonomous driving, and creating diversified, customized and ecological comprehensive operating system solutions.

Major Providers of General Automotive Operating System Solutions in China (In No Particular Order)

Chinese Products		Highlights
Company	Name	
Neusoft Reach	NeuSAR	Enable the development of new vehicle software applications in the stage of cross-domain integration
Baidu	Duer OS	With artificial intelligence algorithms available
AICC	ICVOS	Rapid application development, platform-based, connected, scalable, automotive-grade
Phoenix Auto Intelligence	TINNOVE OpenOS	Ecosystem-level, multi-solution
ThunderSoft	ThunderAuto Intelligent Connected Vehicle Operating System	-
iSOFT Infrastructure Software	AUTOSARCP + AP Integrated Solution	Oriented to the two scenarios of security domain and high-performance computing domain, the implementation of intelligent connection
ArcherMind Technology	FusionOS	Cross-domain fusion vehicle software computing platform
ZTE	Golden OS	Microkernel, built-in hypervisor, oriented to all scenarios of intelligent connection
RT-Thread	RT-Thread	Built-in hypervisor, real-time operating system
PATEO CONNECT+	Qing OS	All-scenario AI ecosystem services

Source: ResearchInChina

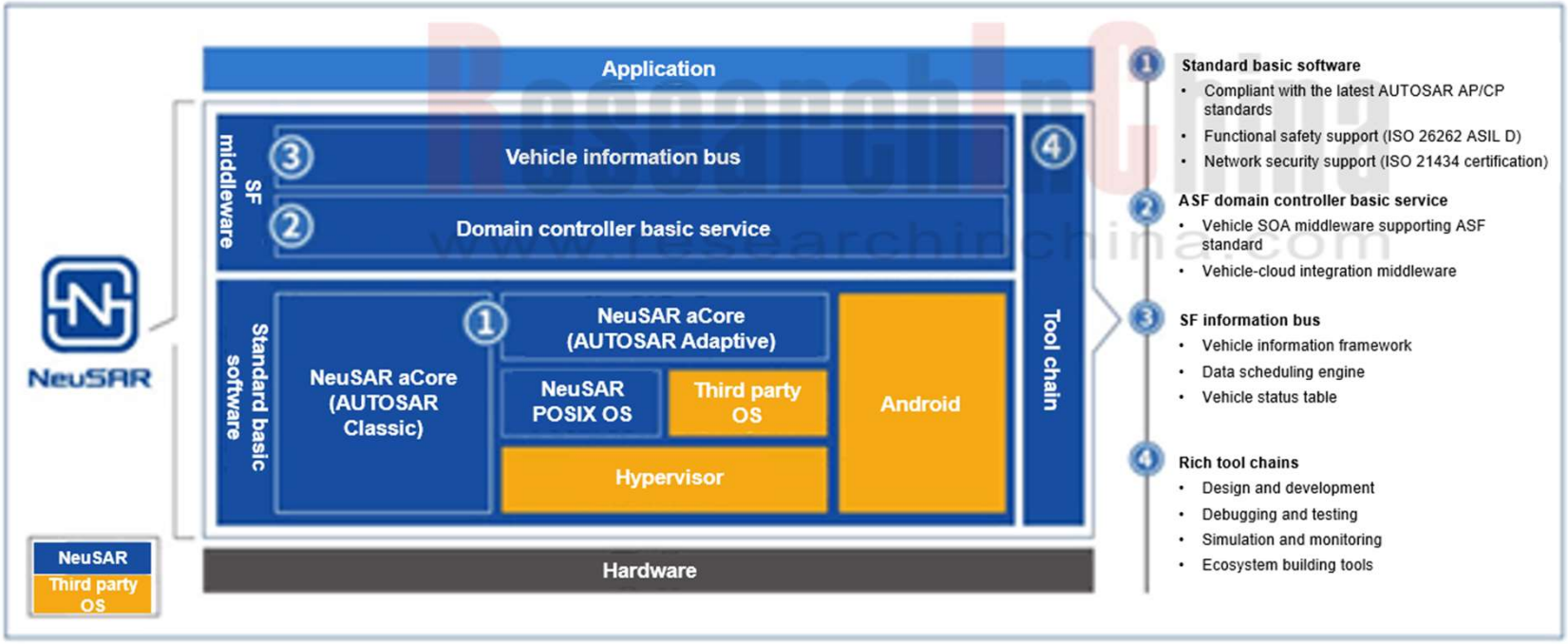
Neusoft NeuSAR

The NeuSAR4.0 upgrades the NeuSAR SF service framework, with advantages in four aspects: the further decoupling of application development software and hardware enables dynamic migration of functions; the more efficient simulation and debugging functions achieves global synchronization of data; the flexible deployment of message channels meets the needs of different application scenarios; the "vehicle" and "cloud" connection allows for the integration of vehicle and cloud services.

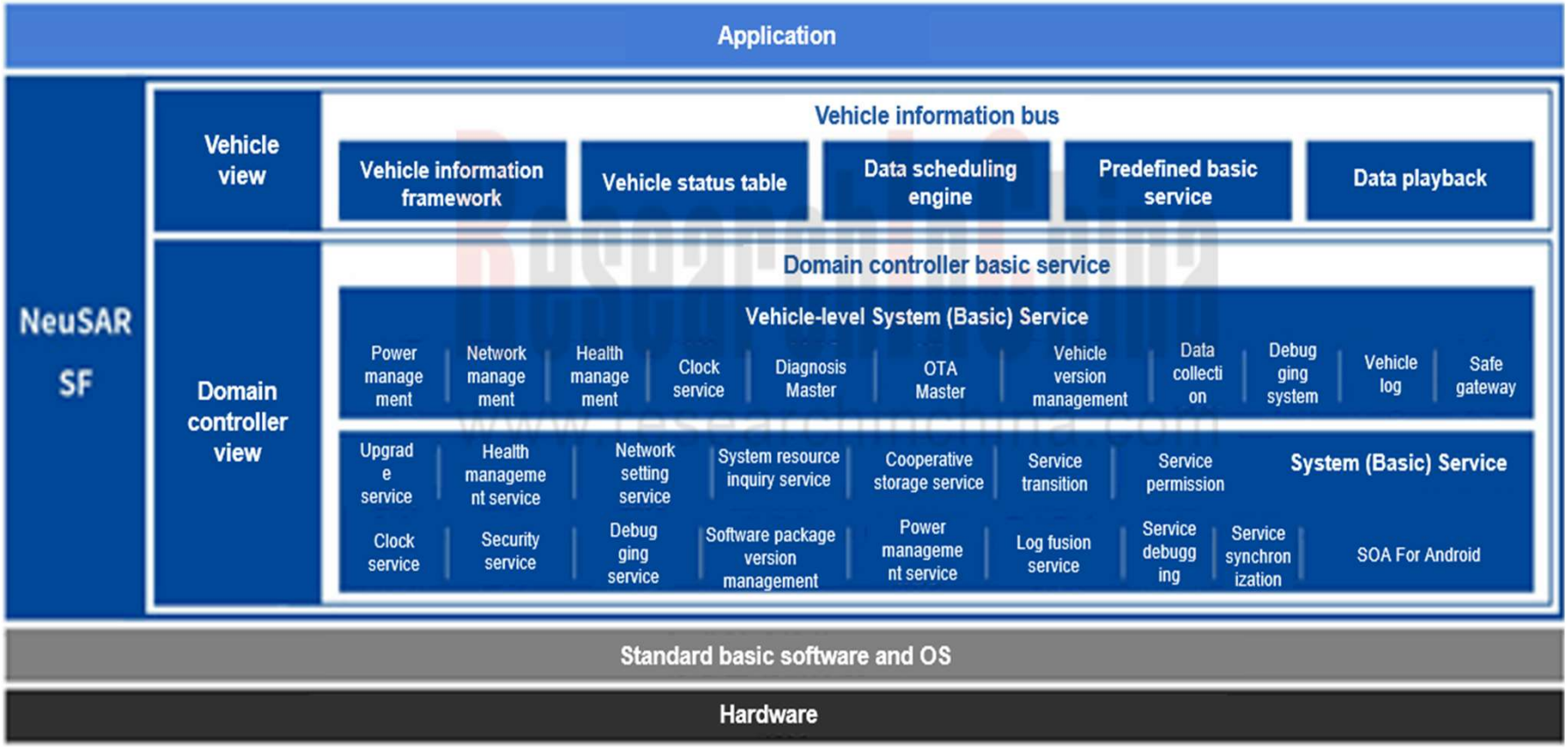
A New Automotive Software Architecture --- NeuSar 4.0 Architecture

Neusoft REACH

NeuSAR is always innovative and evolving, NeuSAR version 4.0 is fully upgraded



Neusoft NeuSAR Application



In addition, NeuSAR4.0 has upgraded the NeuSAR DevKit tool chain, covering NeuSAR Creator (IDE-like integrated development tool), NeuSAR Monitor and NeuSAR Simulator, which can realize the entire domain controller development process, and monitor some dynamic resources in the development process, and simulate the third-party devices that need to be used in the development process, respectively.

ArcherMind Fusion OS

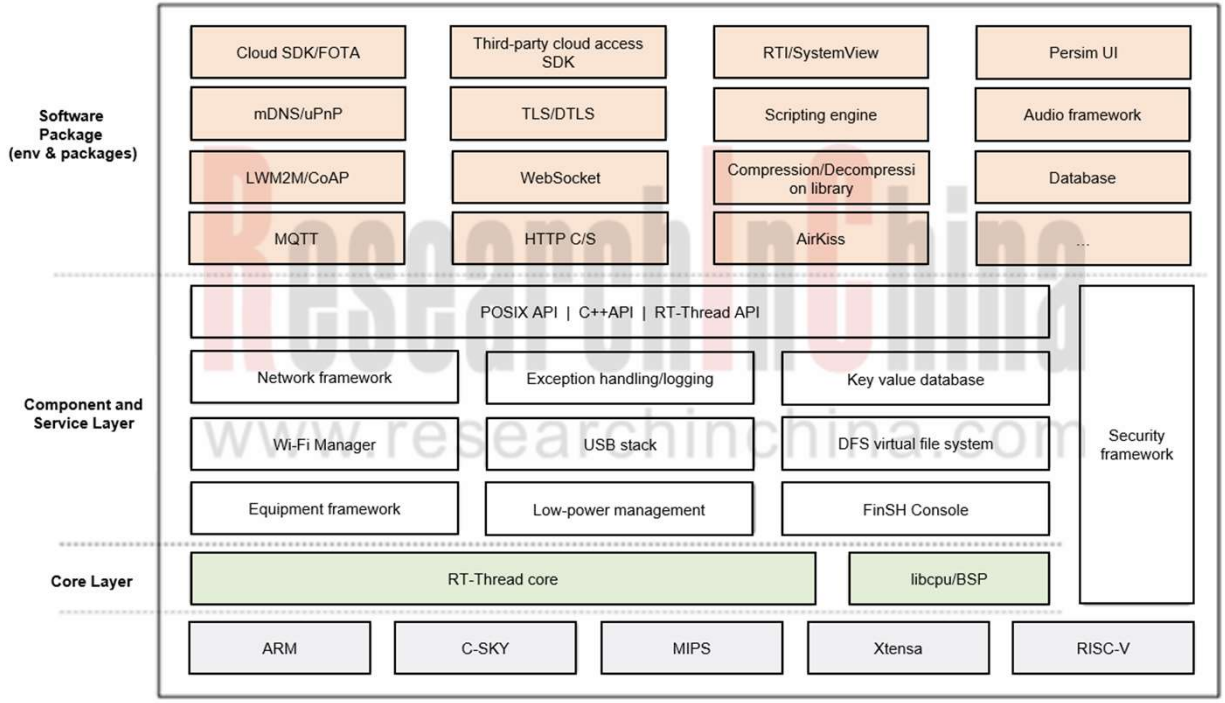
Based on the cooperation with chip vendors like Qualcomm, Renesas, Nvidia, and NXP, ArcherMind launched a fully self-developed cross-domain integrated vehicle software computing platform FusionOS in 2022. As a general operating system middleware solution, it includes intelligent cockpit domain EX6.0, central control domain Fusion3.0, intelligent driving domain operating system solution FusionAD, and cross-domain fusion software operating system solution.

Fusion SOA software platform that covers the six solutions of middleware layer, service layer, operating system & hardware layer, cloud, tool chain, and service plug-in, provides full-stack SOA technical capabilities with mass production experience. It has been adapted to the latest cockpit platforms of multiple automotive-grade chip vendors like Qualcomm, Renesas and SemiDrive, and supports QNX, Android, Linux and other operating systems. It also provides a fully optimized graphics system, AI Orchestra Engine middleware and the latest voice algorithm engine AM Acoustic Engine.

RT-Thread "Cheng Xuan" Vehicle Fusion Software Platform

In 2022, RT-Thread announced the RT-Thread "Cheng Xuan" Vehicle Fusion Software Platform, an embedded real-time operating system composed of kernel, network, file system, and GUI components.

Based on virtualization system vmRT-Thread Hypervisor, Cheng Xuan Vehicle Fusion Software Platform carries the safe real-time system RT-Thread Secure Auto, the microkernel operating system RT-Thread Smart Auto, and Linux or other systems, and can be compatible with multiple system platforms, making it easy to use. It enables information interaction via unified distributed message bus and upper module.



Hypervisor: foreign leading established providers boast much greater first-mover advantages, and Chinese players go all out to catch up

In the global hypervisor market, automotive standard-compliant, mass-produced hypervisor products include Blackberry QNX Hypervisor, Wind River Vxworks, OpenSynergy COQOS, and Linux Foundation's ACRN. In the field of automotive virtual layer in China, there are a growing number of companies independently developing hypervisor, for example, the likes of Banma Zhixing, iSOFT Infrastructure Software, Zlingsmart and ZTE all have technical strength of virtualization, but still lag far behind their foreign peers. The basic hypervisor type is Type-1, and Zlingsmart has realized mass production of its RAITE Hypervisor.

In 2022, foreign hypervisor providers concentrated on fostering partnerships with OEMs in smart mobility scenarios. For example, while maintaining its share in the market, QNX Hypervisor worked to expand application cooperation with such companies as Neta Auto and MarelliTech in driving and cockpit scenarios; OpenSynergy built hypervisor technology cooperation with Qualcomm Snapdragon Automotive Development Platform (ADP) and STMicroelectronics.

Major Chinese and Foreign Hypervisor Providers and Their Products (In No Particular Order)

Provider	Product
Blackberry	QNX Hypervisor
Intel & Linux Foundation	ACRN
OpenSynergy	COQOS
SYSGO	Pike OS
Wind River	Wind River Helix Virtualization Platform
Elektrobit	EB corbos Hypervisor
Harman	Device Virtualization
Virtual Open System	VOSYSmonitor
iSOFT Infrastructure Software	iSOFT Infrastructure Software Hypervisor
Banma Zhixing	AliOS Hypervisor
Zlingsmart	RAITE Hypervisor
ZTE	ZTE Hypervisor (Secure Partition Engine)
China Automotive Innovation Corporation (CAIC)	CAIC Hypervisor

Source: ResearchInChina

IVI mirroring system: build ecosystem barriers, and develop service ecosystems and interactive functions

Apple Carplay, Google Android Auto, Baidu Carlife, and HUAWEI HiCar among others have established influence in IVI mirroring system market. These providers designate IVI mirroring systems for connecting their own brands, so as to pose a brand barrier. New entrants such as Xiaomi and Vivo are also vigorous in the market. Starting with IVI mirroring systems, they build an IoV ecosystem service system, and mainly offer the interactive perception and service connection functions of mirroring systems, which have yet to be used on large scale.

The Latest Developments in IVI Mirroring Systems Inside and Outside China

Type	Provider	Product	Latest Developments
Foreign	Apple	Carplay	Unveiled new CarPlay features at the Worldwide Developers Conference 2022 (WWDC 2022): based on the new iOS 16, enable deep integration with vehicle hardware, connect all in-vehicle screens, and redesign the interactive interface of CarPlay.
	Google	Android Auto	Released the new version 8.6.6250 in December, which improves the Do Not Disturb functionality and supports interface mode switching.
Chinese	Huawei	HUAWEI HiCar	In November, cooperated with Zlingsmart to build a cockpit solution integrated with software and hardware and based on HiCar platform.
	Baidu	Carlife	In February, launched the Samsung Custom Version, adding non-inductive connection methods, e.g., wireless connection and Bluetooth; in December, the Android Version was updated to 8.0.2
	Carbit	EasyConnection	Released version 8.3 in October, realizing non-sensing connection, supporting mobile phone car collaboration and OTA upgrade.
	Vivo	Jovi Incar	Released Jovi inCar 3.0 in November, supporting the phone connection with 1,100 vehicle models, and enhancing collaboration capabilities of service relay, instant transmission and sharing, and hand-cranked stock pictures.
	Xiaomi	CarWith	Released the latest version V1.1.1 in December, which currently conducts close beta tests only in Changan Auchan Z6 and Leapmotor C01.

Source: ResearchInChina

Table of Content (1)

Table of Content (2)

Table of Content (3)

Table of Content (4)

Table of Content (5)

Table of Content (6)

Table of Content (7)

Table of Content (8)

Contact

Beijing Headquarters
TEL: 010-82601561, 82863481
Mobile: 137 1884 5418
Email: report@researchinchina.com

Chengdu Branch

TEL: 028-68738514
FAX: 028-86930659

Website:
www.researchinchina.com

WeChat: zuosiqiche

zuosiqiche

ResearchInChina
www.researchinchina.com