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Automotive Smart Cockpit Design Trend Report, 2021

Smart Cockpit Design Trend Research: Moving to the third living space

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With the continuous development of cockpit hardware and software technology, intelligent cockpit design is evolving, pivoting from functionality to "user experience". Intelligent cockpits are becoming more and more secure, smart and comfortable.

In terms of perception, the cockpit display is not limited to multi screens and large screens, 3D screens and high-definition screens are also emerging.
For cockpit display, multi screens and large screens still prevail. From 2020 to 2021, emerging automakers and traditional automakers have successively launched a number of models equipped with multiple screens and joint screens. For example, Hongqi E-HS9 was equipped with 8 screens at the end of 2020. In 2021, Human Horizons mass-produced and delivered HiPhi X equipped with 9 screens. At the same time, the screen size in the car is getting larger and larger. The center console of Xingyue L, launched in July 2021, has a 1-meter IMAX screen. The center console of Ford EVOS that is planned to be launched in October 2021 will feature a 27-inch 4K display. Cadillac Lyriq to be launched in 2022 will have a 33-inch all-in-one display.
In addition, the screen layout has become more novel and unique. In early 2021, Mercedes-Benz revealed the MBUX Hyperscreen, whose three displays merge almost seamlessly into one another to create an impressive screen band over 141 centimeters wide: Driver display (screen diagonal: 12.3 inch), central display (17.7 inch) and front passenger display (12.3 inch) appear as one visual unit. Three screens sit under a common bonded irregular curved cover glass. For particularly brilliant display quality OLED technology is used for the central and front passenger displays. The MBUX Hyperscreen embodies a strong sense of technology.

EQS Smart Cockpit of Mercedes-Benz

Abstract

The IM L7, which is planned to be mass-produced in 2022, is equipped with a 39-inch smart scenario screen and a 12.8-inch AMOLED center console screen. The 39-inch screen is composed of two joint screens, which can be raised and lowered separately with multiple display modes and allow the content to be switched without boundaries.

Smart Cockpit of IM L7

Driven by high-definition mobile phone displays, consumers have more views on the resolution of automotive displays. Low-resolution displays can no longer meet the needs of the current users. Automotive displays tend to feature higher resolution, higher contrast, wider field of view, more optical indicators, and faster response. In the BMW iX scheduled to be launched at the end of 2021, the new iDrive 8 will come with horizontal curved dual screens: a 12.3-inch LCD cluster screen and 14.9-inch IVI screen (the angle is slightly inclined towards the driver). BMW says screens used in the new system will have a pixel density of 206 pixels per inch (PPI).

PPI of Main Smart Cockpit Displays, 2021

Products	Size	Resolution	PPI
Central display of BMW iX	14.9	2880*1080	206
Central display of Mercedes-Benz S-Class	12.8	1888*1728	200
Central smart joint display of IM L7	39 (2 joint screens)	4320*720 (4K); 1920*720 (2K)	-
Central display of IM L7	12.8	1888*1728	200
Central display of BAIC Arcfox αT	20.3	3840*720	192
Central display of NIO ES6	11.3	1600*1400	188
2021 Cadillac Escalade	16.9	2940*816	181
Central display of Lixiang One	16.2	2608*720	167
Central display of Mercedes-Benz C-Class	12.3	1920*720	166
2021 Tesla Model S	17	2200*1300	150

Source: ResearchInChina

HMI capabilities develop from functional perception interaction to cognitive and active interaction

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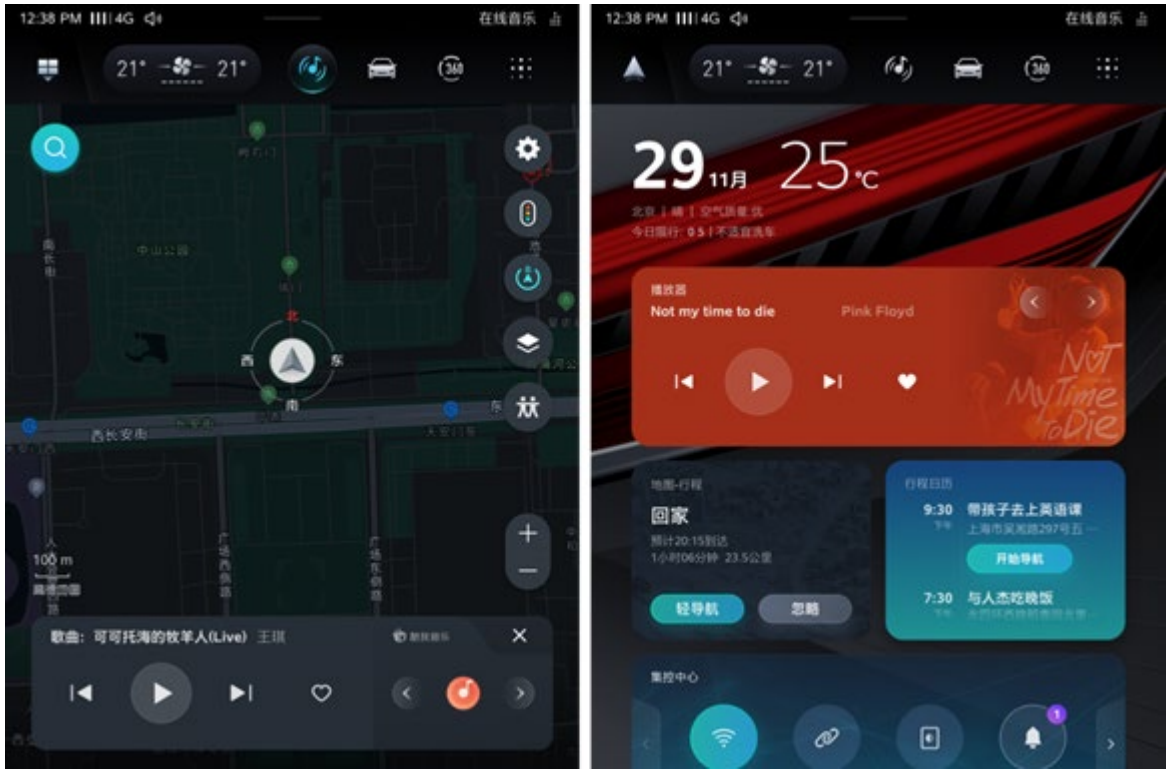
The HMI UI interface design for automobiles is changing on the basis of practical functions. With more and more functions, smart cars are getting cleverer, and the underlying data is more and more abundant. In the future, interface interactions will be more concise, 3D intuitive, younger, transparent, digitized, and symbolized, flattened and the like.

In June 2020, Banma SmartDrive released the Venus Intelligent System whose UI interface adopts the design concept of A-B parallel worlds. World A takes a "map as a desktop", while World B uses a waterfall layout. Users can intuitively find commonly used functions on the interface, and even set the display interface as what they want.

Venus Intelligent System of Banma SmartDrive - AB Worlds



Source: Banma SmartDrive

Mercedes-Benz MBUX Hyperscreen

MBUX Hyperscreen can display the desired personalized functions for users on the main interface of the central screen at an appropriate time, enabling "zero-layer" operation without scrolling or turning pages, bringing relaxed and intimate HMI experience.

"Zero-layer" Interactive Interface of Mercedes-Benz MBUX Hyperscreen

Innovation and breakthroughs in UI interface design are inseparable from the development of HMI design tools.

In terms of HMI design and development tools, many companies have released the latest products. Lately, HMI design and development tools feature multiple platforms, multiple algorithms, reusable software framework, 3D interface design, etc.

In addition, with the creation of the third space of the smart cockpit and the continuous improvement of entertainment, technology HMI design companies such as web game companies like Eptic Games have dabbled in the automotive market.

Latest Products of Main HMI Design and Development Tools

The Latest Products and Features of Main HMI Design and Development Tools

Enterprises	Latest HMI products	Release date	Main new features and highlights
ThunderSoft	Kanzi One	September 2021	① Fully compatible with Android; ② 3D graphics rendering; ③ Integrated tool chain; ④ kanzi VR test & verification; ⑤ Activity management system, simple development process
CANDERA	CGI Stueio 3.10	June 2021	① No matter what the programming algorithm is, Smart Importer can quickly create HMI, and can directly convert graphics into HMI, allowing direct import of PSD, sketch or Axure RP; ② Add Japanese interface; ③ A new menu list control allows users to create menus for their HMI applications, etc.; ④ Enhanced Candera LINK remote services; ⑤ Hardware extension, Infineon Traveo is supported
Altia	Altia Design 13.2	May 2021	①Dynamic list objects; ②Colorful emoticons; ③Drag and drop ④3D mixed mode; ⑤Dark mode; ⑥9-slice Image Scaling
Elektrobit (EB)	EB GUIDE 6.11	2021	An HMI development platform uses voice, touch and gesture control to implement intuitive graphical 2D or 3D user interfaces
Qt	Qt6.1	2021	This is a framework, a code base, and supports any platform.
Qt	Qt Design Studio 2.1	April 2021	Designers and developers can use it, which supports Qt6.0 and later versions

Source: ResearchInChina

Through the fusion applications of AI, smart atmosphere lights, smart surface materials, fragrance systems, smart seats and other products and technologies, voice, AI assistants, face recognition, gestures, face, fingerprint, vital signs detection and other HMI technologies and models have been available in cars.

The smart cockpit has certain HMI experience and scenario-based capabilities, and the cockpit scenario interaction is more intelligent, emotional, and humane. HiPhi X, which was mass-produced and delivered in 2021, can recognize the driver's expression, voice, heart rate, blood oxygen, blood pressure, breathing rate, etc. through 52 biosensors, and then adjust music and temperature, or take over the vehicle in dangerous situations.

Samsung Digital Cockpit with Automotive Samsung Health

At CES 2021, Samsung exhibited a digital cockpit equipped with Automotive Samsung Health, which analyzes passengers' health status before boarding by utilizing a combination of cameras and wearable and mobile devices installed in the vehicle. In the car, it also regularly monitors passengers' stress levels and will adjust the vehicle's lighting, scent, or music in an effort to help them relax.

With the HMI design concept focusing on "user experience", HMI is developing from basic functional perception interaction to cognitive and active interaction through AI, in-car and out-of-car perception technologies.

2021 Samsung Digital Cockpit with Automotive Samsung Health

Smart cockpits realize custom programming through SOA software

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Since smart cockpits are designed as per human-oriented user experience, personalization will become a major development trend of smart cockpits in the future. In addition to the basic personalized custom settings such as the initial IVI system and buttons, the software architecture can help realize the personalized custom settings of multiple scenarios in the car.

For example, the WM W6, which was launched at the Shanghai Auto Show in 2021, WM W6 realizes personalized combinations and settings of scenarios based on SOA software and through APP custom programming.

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Custom Scenario Programming Card for WM W6

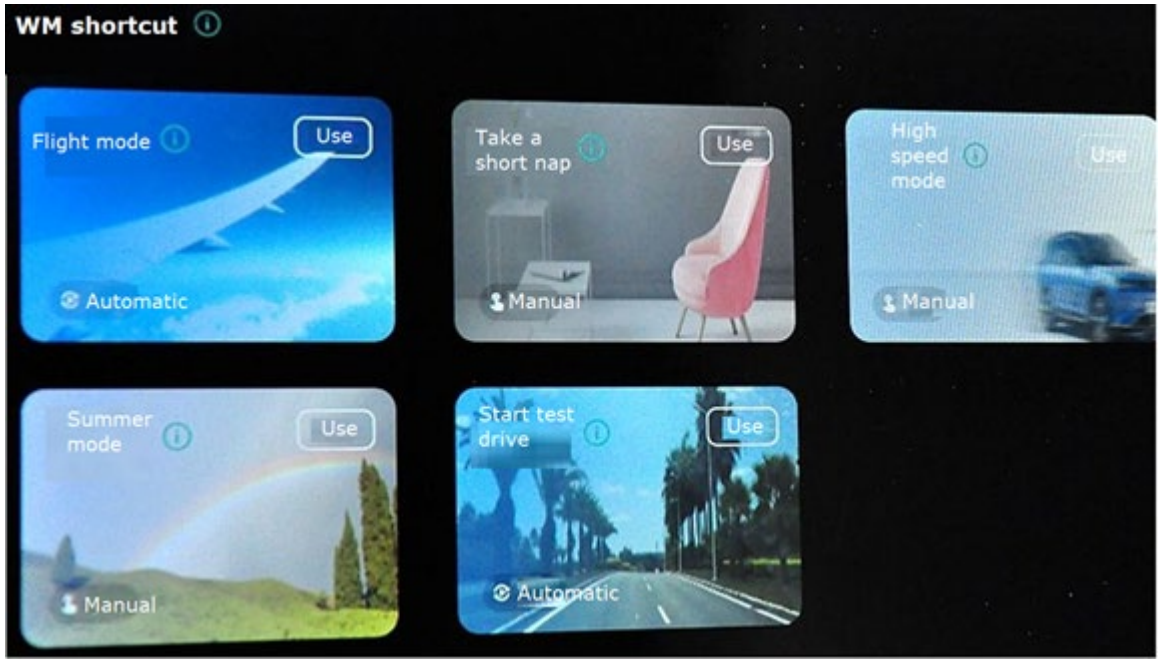

Table of Content (1)

Table of Content (2)

Table of Content (3)

Table of Content (4)

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