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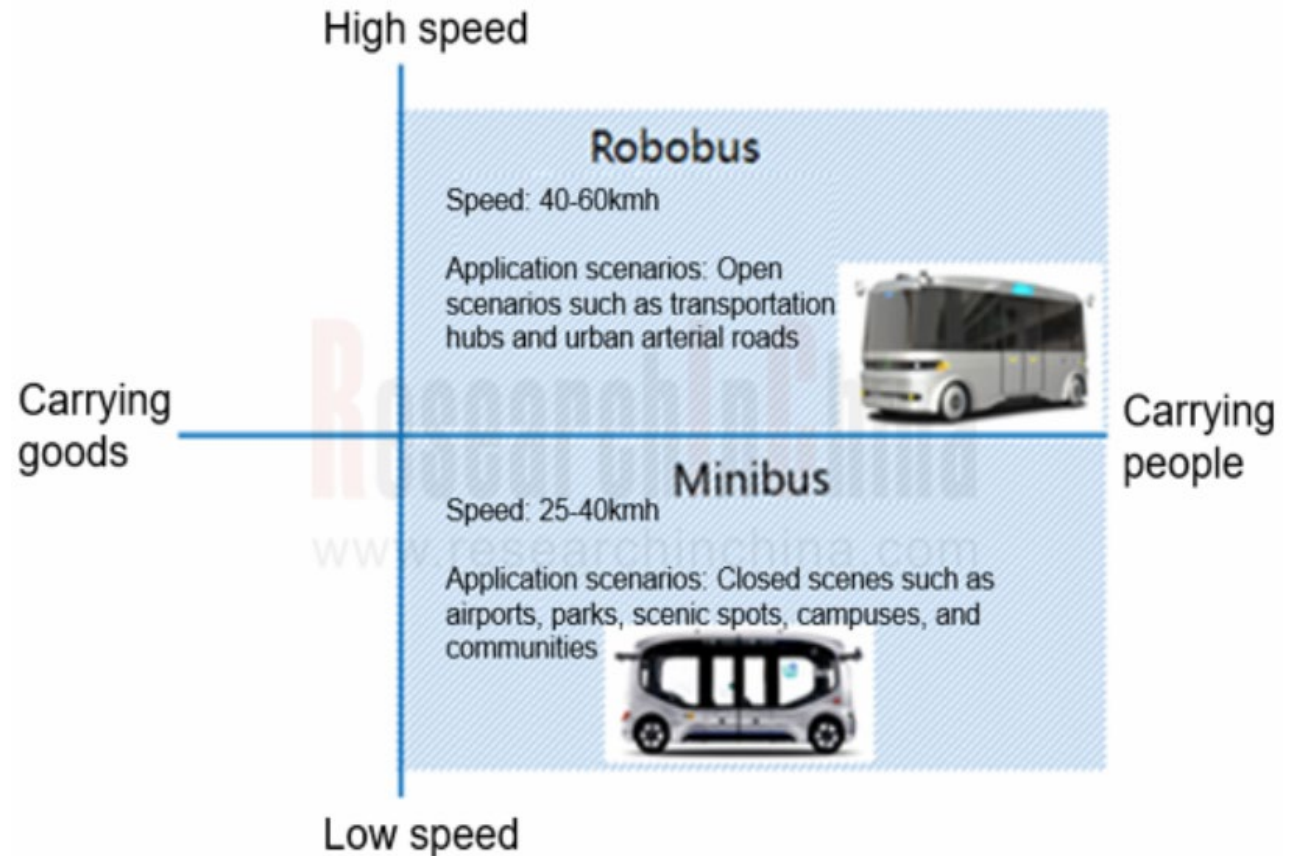
# **China      Autonomous      Shuttle Market Report, 2022-2023**

Feb. 2023

# Autonomous Shuttle Research: application scenarios further extend amidst policy promotion and continuous exploration

Autonomous shuttles are roughly categorized into minibuses and robobuses. Minibuses, namely micro-circulation shuttle buses, mostly work in airports, parks, scenic spots, campuses, communities and other scenarios at speeds of 25-45km/h. Typical minibuses are offered by FAW Hongqi, Baidu Apollo and UISEE.

Robobuses are autonomous minibuses running at 40-60 km/h under the control of software. They are often seen in open scenarios such as transportation hubs and urban trunk roads, and provide urban public transport services. Representative robobuses include Qcraft ONE and MOGO BUS M2.



# I. Autonomous driving solution providers flood into the arena of shuttle buses.

In the arena of shuttle buses, main players embrace OEMs, auto parts companies and autonomous driving solution providers, among which L4 autonomous driving technology providers perform stunningly. For example, the robobus co-built by Shanghai Space and PIX Moving was delivered offline in March 2022, and officially began to provide short-distance shuttle services between Wangjiazhuang Subway Station and Xiantao Big Data Valley, Yubei District, Chongqing in June 2022. In July 2022, the driverless buses from Idriverplus landed in Beijing Dongsheng Science and Technology Park to start the normal operation and serve commuters in the park. In September 2022, MOGO officially released the autonomous OEM production buses - MOGO BUS M1 (autonomous minibus) and MOGO BUS M2 (autonomous bus), both equipped with the "vehicle-road-cloud integration" system.

As well robotaxis that adopt L4 technology, autonomous shuttles boast sensors such as LiDAR, radar and cameras, and combine cloud software and sensors to enable vehicle positioning, environmental perception, path planning & decision, and vehicle control & actuation. At present, many L4 technical solution providers like QCraft, UISEE, MOGO, WeRide and Baidu Apollo have laid out technology routes for both robotaxis and robobuses.

**Some Typical Companies Involved in Autonomous Shuttle Industry and Their Products**

Type	Typical Company	Autonomous Shuttle		
OEM	FAW Hongqi	Intelligent minibus		
	Dongfeng Yuexiang	Sharing-VAN	Sharing-BUS	Autonomous sightseeing vehicle
	Yutong Group	Xiaoyu 2.0	E6S microcirculation minibus	Yumeng E7S
	Toyota	e-Palette	APM	MX221
Parts supplier	HOLON	Autonomous bus (Holon Mover)		
	Skywilling	Skywilling shuttle bus		
Autonomous driving solution provider	Space Technology	Microcirculation robobus		
	Bus Me	Autonomous shuttle BM-01		
	Idriverplus	Idriverplus robobus		
	Ant Ranger	"City Light" shuttle bus	"Urban Elf" shuttle bus	
	Freotech	Autonomous minibus "Lanpangpang"		
	SenseAuto	Autonomous shuttle	Autonomous AR minibus	
	UISEE	Autonomous shuttle (minibus)	Autonomous shuttle (medium bus)	Autonomous shuttle (bus B13)
	Unity Drive	Snow Lion Series Autonomous Shuttle Vehicle		
	ECHIEV	Yixing S3	Yixing S2	Yixing S1
	QCraft	ONE	SPACE	
	WeRide	Microcirculation minibus		
	MOGO	MOGO BUS M1	MOGO BUS M2	
	Baidu Apollo	Minibus (Apolong)	Robobus	Rover
	Nava	Autonom® Shuttle Evo		
	EasyMile	EZ10		

Source: ResearchInChina

## II. The operation scenarios of autonomous shuttles are extending from designated areas and low-speed scenarios to open environments and complex scenarios.

At present, autonomous shuttles are running from closed and semi-closed designated areas (parks, scenic spots, factories, communities, campuses, airports, etc.) to urban public roads as subway shuttle buses, urban microcirculation buses, and autonomous buses for ride-hailing services.

**Application Scenarios of Some Autonomous Shuttles**

Company	Autonomous shuttle	Application scenario							
		Park	Scenic spot	Community	Factory	Hospital	Campus	Airport	Urban public road
Baidu Apollo	Minibus (Apollo)	✓	✓	✓	✓		✓		✓
ECHIEV	Yixing S3	✓	✓		✓	✓			✓
MOGO	MOGO BUS M1	✓	✓					✓	✓
WeRide	Microcirculation minibus	✓	✓						✓
UISEE	Autonomous shuttle (minibus)	✓	✓	✓	✓			✓	✓
Idriverplus	Idriverplus robobus	✓	✓					✓	✓
Dongfeng Yuexiang	Autonomous Sharing-Van	✓	✓						✓
Yutong Group	Xiaoyu 2.0	✓	✓					✓	✓
Navya	Autonom® Shuttle Evo	✓	✓			✓			✓
EasyMile	EZ10	✓	✓				✓		✓

Source: ResearchInChina



### III. The current growth of the autonomous shuttle market is mainly driven by policies and smart road upgrades.

#### 1. China, the United States, Japan, and South Korea have issued favorable policies for autonomous buses.

Japan, the United States and South Korea among other foreign countries have introduced policies to encourage the commercial operation of autonomous vehicles like autonomous shuttles.

- On March 10, 2022, the National Highway Traffic Safety Administration (NHTSA) of the United States issued a first-of-its-kind final rule, the Occupant Protection Safety Standards for Vehicles Without Driving Controls, no longer requiring automated vehicle manufacturers to equip their ADS-enabled vehicles with traditional manual controls to meet crash standards.
- Japan decided to allow for use of L4 autonomous vehicles (controlled by system) in transit and delivery services from April 1, 2023.
- South Korea proposed a goal of commercializing L4 (highly automated) autonomous buses and shuttle buses by 2025 under its "Mobility Innovation Roadmap". On November 25, 2022, Seoul, capital of South Korea, opened the first autonomous bus line with a total mileage of about 3.4 kilometers, marking South Korea's first step to commercialize autonomous shuttles.

In China, Beijing, Shenzhen and other cities have standardized autonomous shuttles in terms of product standards and administration, setting an example for the development of the industry.

In January 2022, the "Automated Driving Bus" association standard jointly drafted by Baidu, China Academy of Information and Communications Technology (CAICT), ZTE and Geely was officially released. This standard covers two parts: Automated Driving Bus - Part 1: Vehicle Operation Technical Requirements, and Autonomous Bus - Part 2: Test Methods and Requirement of Automated Driving Feature. They specify the technical requirements for autonomous buses in terms of basic safety, information security, operation safety and autonomous driving tests.

- In March 2022, Beijing High-level Autonomous Driving Demonstration Zone issued the Detailed Implementation Rules for Road Testing and Demonstrative Application of Intelligent Connected Buses in Beijing Intelligent Connected Vehicle Policy Pilot Zone (Trial), posing specific administrative requirements for in-vehicle management, vehicle operation, road test, insurance and technical parameters.
- In November, 2022, Beijing High-level autonomous driving Demonstration Zone issued the "Detailed Rules for the Administration of Autonomous Shuttles in Beijing Intelligent Connected Vehicle Policy Pilot Zone (Road Testing and Demonstrative Application)". It is China's first normative policy for new short-distance passenger transport intelligent connected products without a driver's seat or steering wheel and is also China's first policy to give corresponding right of way to autonomous shuttles in a coded form.

# Standards and Specifications for Autonomous Shuttles in China

Standards and Specifications for Autonomous Shuttles in China

	Coverage	Time	Issuer	Policy	Overview
Standards	Nationwide	Apr. 2022	Jointly initiated by China Industry Innovation Alliance for the Intelligent and Connected Vehicles (CAICV), Beijing Institute of Technology, China Intelligent and Connected Vehicles (Beijing) Research Institute Co., Ltd. (CICV), CAERI ICTC and Dongfeng Yuexiang	Methods and Requirements for Field Test of Autonomous Driving Functions of Functional Autonomous Vehicles (Association Standard)	Established the test standards in the functional autonomous vehicle standard system to meet the industry's requirements for standardized application of functional autonomous vehicles at this stage
		Jan. 2022	Released by China ITS Industry Alliance, drafted by Baidu as a leader	Automated Driving Bus - Part 1: Vehicle Operation Technical Requirements, Autonomous Bus - Part 2: Test Methods and Requirement of Automated Driving Feature	Specify the technical requirements for autonomous buses in terms of basic safety, information security, operation safety and autonomous driving tests. Other drafters include China Academy of Information and Communications Technology (CAICT), Shenzhen Future Intelligent Network Transportation System Industry Innovation Center, Tongji University, SaimoAI, Xiamen King Long, Hunan Xiangjiang Intelligent Science and Technology Innovation Center, ZTE and Geely.
		Aug. 2022	Initiated by Shenzhen Intelligent Transportation Industry Association and Shenzhen CPS Unmanned System Research Institute	Administrative Rules for Safety Operation of Low-speed Autonomous Shuttles in Scenic Spots, Parks, Neighborhoods and Communities (Association Standard)	It is an industry standard for autonomous shuttles in designated scenarios that integrate safety certification, special insurance, judicial appraisal and other necessary supports, highlighting the commercialization of such buses.
	Shenzhen	Oct. 2021	Initiated by Shenzhen Intelligent Transportation Industry Association	Administrative Rules for Commercial Operation Safety of Low-speed Autonomous Vehicles (Association Standard)	It is China's first pioneering standard specially formulated for the application of service scenarios of low-speed autonomous vehicles. It is initiated by Shenzhen Intelligent Transportation Industry Association, and compiled by more than 37 units and 112 experts in the field of low-speed autonomous vehicles, with Dongfeng Yuexiang as the key drafter.
Administrative Rules	Beijing	Nov. 2022	The Office of Beijing High-level Autonomous Driving Demonstration Zone	Detailed Rules for the Administration of Autonomous Shuttles in Beijing Intelligent Connected Vehicle Policy Pilot Zone (Road Testing and Demonstrative Application)	It is China's first normative policy for new short-distance passenger transport intelligent connected products without a driver's seat or steering wheel and is also China's first policy to give corresponding right of way to autonomous shuttles in a coded form.
		Mar. 2022	The Office of Beijing High-level Autonomous Driving Demonstration Zone	Detailed Implementation Rules for Road Testing and Demonstrative Application of Intelligent Connected Buses in Beijing Intelligent Connected Vehicle Policy Pilot Zone (Trial)	The demonstration zone has issued test licenses to eight intelligent connected buses of Baidu, QCraft and SenseTime.

Source: ResearchInChina

### III. The current growth of the autonomous shuttle market is mainly driven by policies and smart road upgrades

#### 2. The construction and upgrading of smart roads accelerate the large-scale application of autonomous shuttles.

The construction of smart roads is the premise for operating autonomous shuttles. In particular, the planning of smart bus lines in various urban demonstration areas has favored the application of robobuses. So far, Beijing, Xiong'an New Area, Guangzhou, Ezhou, Zibo, Changsha, Wuxi, Zhengzhou, Chongqing, Hainan and the like have taken the lead in introducing autonomous shuttles on the basis of smart roads.

As of September 2022, Wuhan Economic & Technological Development Zone had opened 321km test roads in total for intelligent connected vehicles, of which 106km is fully covered by 5G and CVIS. It had deployed more than 1,800 intelligent roadside units such as cameras, LiDARs, radars and edge computing servers at 96 smart intersections to support real-time information exchange between vehicles, between vehicles and roads, between vehicles and the Internet. Among the autonomous shuttles landing in Wuhan Economic & Technological Development Zone, more than 30 Sharing-VANs from Dongfeng Yuexiang have come into normal operation, travelling a total of over 209,000 kilometers.

Guangzhou has opened a total of 353 test sections for intelligent connected vehicles, with a cumulative one-way mileage of 654.451 kilometers and a two-way mileage of 1,308.902 kilometers. From August 2022 to December 2023, Guangzhou starts an autonomous driving pilot project for urban mobility, and introduces 50 autonomous buses from different companies on the loop lines around Canton Tower and Guangzhou International Bio Island, providing at least 1 million rides for passengers.

Accompanied by the construction and upgrading of smart roads as well as the promotion of seamless mobility services, autonomous shuttles and robotaxi will be integrated into intelligent city transportation systems together to offer diversified smart mobility services.

## IV. Autonomous shuttle companies are exploring new business models such as PRT

Autonomous shuttles are a solution to “first-mile and last-mile” mobility. As autonomous shuttles penetrate into urban communities, subway stations, etc., how to activate the “peripheral nerves” of urban traffic on large scale is one of the issues that need urgent consideration in urban governance.

For seamless mobility services, some companies are exploring new business models.

For example, Dongfeng Yuexiang's S-PRT (Sharing-Personal Rapid Transit) is a shared novel autonomous public transportation system composed of fully autonomous small vehicles and dedicated road networks. As a rapid nonstop public transportation tool with low construction cost (one-fifteenth of subways), it can transport an average of 10,000 to 30,000 people per hour at the average speed of 40-60km/h, and allows users to reserve without needing to wait. Dongfeng Yuexiang aims for test and demonstration of an operating mileage of more than 10 million kilometers in the Xiong'an New Area within three years, and promotes the "Xiong'an Solution" with partners in no less than 30 cities.

At the beginning of 2023, PIX Moving signed a strategic agreement with Common Rail (Hangzhou) Intelligent Industry Development Co., Ltd. on joint construction of a common rail project in Xiaoshan, Hangzhou. They will provide autonomous shuttles based on PIX's chassis technology to solve the problems of large-scale commercialization of autonomous driving technology and urban traffic congestion.

**Dongfeng's Intelligent Transportation Solution: S-PRT**



Source: Dongfeng Yuexiang



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