Global and China Automotive Millimeter-wave (MMW) Radar Industry Report, 2020-2021

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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

Our Global and China Automotive Millimeter-wave (MMW) Radar Industry Report, 2020-2021 combs through and summarizes the characteristics of the global and China passenger car radar markets, related enterprises' characteristics, development trends and so forth. In the years to come, ADAS functions upgrade, new cockpit applications (e.g., life signs monitoring), and 4D radar launches will combine to drive up the demand for automotive radars.

In 2025, China passenger car ADAS functions will carry more than 31 million radars, with demand AAGR of 30.7%.

In 2020, a total of 8.19 million radars were installed in passenger cars in China, including 4.77 million front view radars and 3.31 million rear angle radars. These radars were demanded by front and side road environment detections among L1-L2 ADAS functions.

From current mainstream ADAS system solutions, it can be seen that L1 depends on 1R, 1V or 1R1V solution that features simple perception strategy and needs a limited number of radars; L2 needs more radars for requiring a higher level of sensor fusion. Noticeably, the use of 5R1V in vehicles in 2020 provided a further boost to the radar demand.

Installation Structure of Mainstream L1 ADAS Solutions in Passenger Cars in China

Solution	2019	2020
1R	38%	39%
1V	16%	26%
1R1V	15%	18%

Source: ResearchInChina

Installation Structure of Mainstream L2 ADAS Solutions in Passenger Cars in China

Solution	2019	2020
1R1V	53.5%	59.2%
3R1V	30.6%	30.3%
1V	7.3%	7.6%
2R1V	7.6%	1.7%
5R1V	0.01%	0.9%

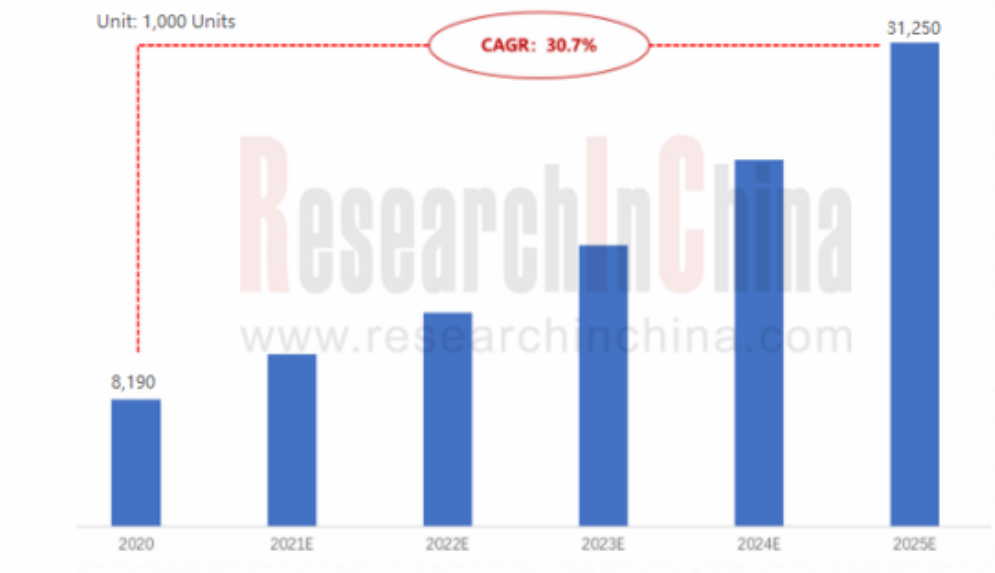
Source: ResearchInChina

In a word, the increasing number of sensors per autonomous vehicle is accompanied by ADAS functions upgrade. It is estimated that passenger cars in China will be equipped with over 31 million radars in 2025.

The growth in the demand is expected to follow such trajectory:

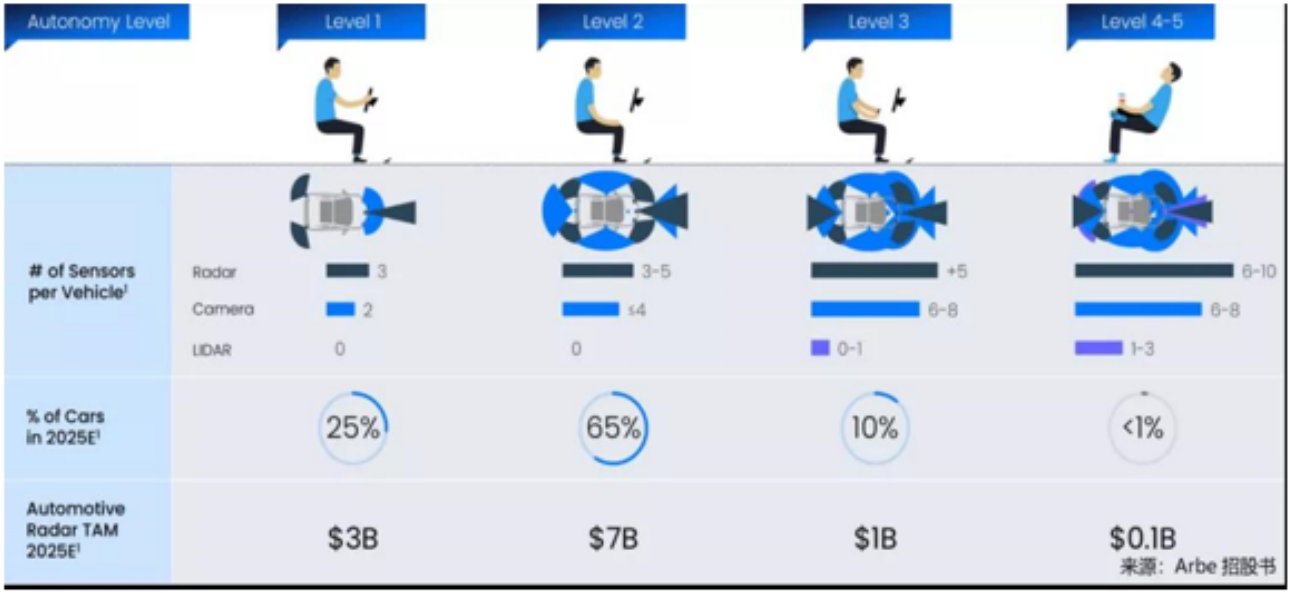
- The upgrade from L1 to L2/L3 will demand 3 or 5 radars;
- For L4/L5, single vehicle may need 7 or even more radars (deployed at both sides of vehicle body);
- ADAS upgrade will fuel the demand for front view radars at first, and then rear angle ones;
- The front view radar + rear angle radar solution is becoming a basic configuration, and the increasing demand for front view radars comes with the launch of L3 functions.

Installation of Radars for Passenger Car ADAS Functions in China, 2020-2025E



The following picture shows Arbe's prediction about the demand for various sensors from ADAS in 2025. Arbe argues that in five years, L1 ADAS will be configured with 3 radars, L3 with over 5, and L4-L5 possibly even with as many as 6 to 10. Arbe expresses obvious optimism about the demand for radars.

Global Demand for Sensors from AD/ADAS Market and Radar Market Size, 2025E



Cockpit applications like vital signs monitoring and gesture control are expected to be a new engine to the radar growth.

As intelligent cockpit evolves, radars are finding their way into new areas. Currently, they are largely used in cockpits for vital signs monitoring and gesture control.

A. Vital signs monitoring: Wuhu Sensortech Intelligent Technology Co., Ltd. (WHST) was the first one to achieve mass-production

At present, in-vehicle monitoring mainly adopts cameras which invade privacy, while radars can ease the concern. In April 2020, HYCAN 007, a mass-produced model under the brand co-created by GAC and NIO became available on market, which also means the mass production of STA79-4, WHST's automotive radar used in the car for vital signs monitoring.

In June 2020, at its "Online Launch of Vital Signs Monitoring Technology", Great Wall Motor also used STA79-4 for vital signs monitoring in vehicle. The solution has been mounted on 2021 WEY VV6.

B. Gesture control: the foreign vendor Acconeer and China's WHST are exploring.

In-vehicle gesture control is currently enabled using cameras, but the technology requires ultrahigh accuracy devices. 60GHz radar that features up to 7GHz bandwidth for sub-micron resolution required by gesture control becomes a new option for cockpit gesture control. More than that, 60GHz radar can penetrate materials to transmit signals, and the integrated design makes it more compact enough to be hidden inside the housing of a device.

In 2018, Sweden-based Acconeer rolled out A111, a 60GHz pulsed coherent radar applicable to vehicles for smoothly controlling the vehicle functions to be actuated. Furthermore, it can be applied widely in areas from robots and drones, and mobile and wearable devices to Internet of Things, power tools and industry, healthcare and fitness. In automobiles, it is often used for gesture recognition and safety alert.

Acconeer A111 Pulsed Coherent Radar

4D radars being installed in vehicles enjoys a rosy prospect.

4D radar outperforms a 3D one in the following three aspects:

(1) Detect “height”, for example, distinguishing an overpass from vehicles on the road;

(2) Offer higher resolution: 1-degree angular resolution (even lower in the case of super resolution algorithm) in both azimuth and elevation;

(3) Classify static obstacles, able to detect roadside obstacles and small targets, e.g., water bottles and tire fragments.

The unique edge ensures 4D radars to work better in detection of static obstacles and support L3-L5 highly automated driving. As for its application scenarios, 4D radars will be massively seen in ADAS front view function in future to replace some few-channel LiDARs, expectedly becoming a “new star” in radar market.

Current foreign 4D radar vendors are divided into two types: conventional Tier1 suppliers like Continental, Aptiv and ZF; start-ups, typically Arbe, Oculii and Vayyar.

Chinese players such as WHST, MUNIU Technology and Huawei, started late but gather pace.

Progress of 4D Radar Products of Some Companies Worldwide

Region	Company	Headquarter	4D Radar Product	Progress
Foreign	Continental	Germany	ARS540	To be mass-produced in 2021
	ZF	Germany	FRGen21	To be mass-produced in 2022
	Aptiv	Germany	FLR4+	/
	Oculii	United States	Eagle Family	/
	RADSee	Israel	/	Released in Feb. 2021
	Smart Radar	South Korea	/	Released in 2020
China	WHST	Wuhu	STA79-3-Pro	
	MUNIU Technology	Beijing	O-79	Released the prototype in 2020
	Huawei	Shenzhen	/	Announced orders from automakers in Sept. 2020
	Cheng-Tech	Shenzhen	CTLRR-400 CTCR-400	Released in July 2020

Source: ResearchInChina

The curtain on the mass-production of 4D radars has been lifted. Continental ARS540 ordered by BMW is to be spawned in 2021; ZF 4D radar mounted on SAIC R ES33 will be produced in quantity in 2022.

In March 2021, SAIC R Brand showcased ES33, its new model of strategic importance. 2 ZF 4D radars are installed at the front bumper of the car, affording an over 300m detection range. Besides, ES33 also bears 31 other perception hardware devices including 1 LiDAR and 12 cameras, hoping to enable L3-L4 automated driving.

As well as OEMs welcoming 4D radar, capital favors it, too. Since 2020, the financing for nearly 50% start-ups in radar industry has gone to 4D radar.

Financing in Radar Industry, 2020-2021 (Part)

Region	Company	Time	Round	Raised Funds
Foreign	RADSee*	Feb. 2021	-	USD3 mln
	Smart Radar*	Jan. 2021	Strategic funding	KRW11.2 bn (about USD10+ mln)
	Uhnder*	Dec. 2020	C	USD45 mln
	Lunewave	Dec. 2020	A	Unreleased
	Lunewave	Nov. 2020	Strategic funding	USD7 mln
	Oculii*	May 2020	-	USD8.5 mln
China	Cheng-Tech*	Nov. 2020	A+	Unreleased
	RadarEye Technology	Nov. 2020	Pre-A+	Tens of millions of yuan
	TransMicrowave	Oct. 2020	A	RMB30 mln
	Waython Intelligent Technologies	May 2020	Pre-A	RMB20 mln
	Qinglei Technology	May 2020	Angel	Tens of millions of yuan
	Chuhang Tech	Apr. 2020	A+	Tens of millions of yuan
Note: * means the firm has 4D radar products.				

Source: ResearchInChina

Also, some traditional OEMs and Tier1 suppliers bet on 4D radars in recent years. For example, SAIC, Honda, Toyota and Denso invested in Metawave between 2017 and 2019; BAIC participated in the USD32 million funding round Arbe closed in 2019; in 2020, Hella was an investor in Oculii's USD8.5 million strategic funding round.

Financing of Some Typical 4D Radars Companies

Company	Time	Round	Raised Funds	Investors
Metawave	2017	Seed	USD7 mln	SAIC, etc.
	2018	/	USD10 mln	Honda, Toyota, Denso, etc.
	2019	A	/	Denso (leading investor)
Oculii	2015	Seed	USD3.5 mln	PreAngel, Qihoo 360, etc.
	2017	/	USD11 mln	/
	2018	/	USD7 mln	/
	2020	/	USD8.5 mln	Hella, etc.
Arbe Robotics	2017	/	USD2.5 mln	/
	2017	A	USD9 mln	O.G. Tech Ventures, etc.
	2018	Additional funding	USD10 mln	/
	2019	/	USD32 mln	BAIC Capital, etc.

Source: ResearchInChina

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