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INTERCHINA INSIGHT

THE ROAD AHEAD: PROSPECTS FOR AUTONOMOUS DRIVING IN CHINA

In many respects the optimism surrounding autonomous driving (AD) is justified. The growth of the robo-taxi sector is particularly striking, with pilots now launching in Shanghai, Changsha and Guangzhou. In this article, InterChina Partner Simon Zhang discusses the potential for AD in China, combined with the tough questions posed by technical, regulatory, and security issues.

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Despite continued challenges the prospects for autonomous driving remain strong, says Simon Zhang.

In many respects the optimism surrounding autonomous driving (AD) is justified. Take one look at the Chinese market in recent months and it has been characterised by a number of announcements on trials of robo-taxis (self-driving taxis), while investor appetite remains very strong.

But the combination of technical, regulatory, and security issues continue to pose tough questions. In this briefing we outline the short to medium term prospects for the sector and whether, ultimately, the opportunity is still too good to miss.

Investor interest

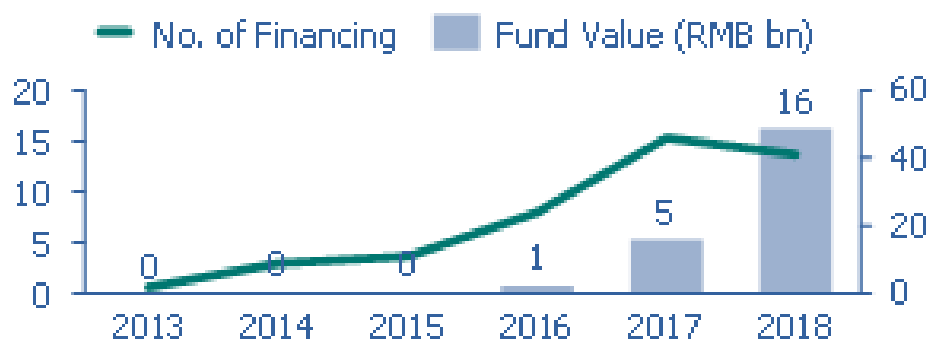
China is catching up fast on the US in terms of AD testing and commercialisation, and those companies with a good chance of being able to commercialise their offering are attracting strong investor interest.

Venture capital and especially internet players continue to be drawn to the Chinese AD sector

amid the lure of a high return on investment. Internet players see a particularly strong opportunity to enter a new sector as they can develop AD systems which are close to their core AI (Artificial Intelligence) capability, providing a good story for the stock market. Leading players such as Baidu, Tencent and Pony.ai have also struck partnerships with major automotive OEMs which are busy developing their own AD platforms and who see the Chinese market as a key part of their global strategy.

Chart #1

Funding of China AD Companies Still Ongoing



Source: InterChina Interviews and Analysis

Robo-taxis

The growth of the robo-taxi sector is particularly striking. Because the days of AD passenger vehicle sales are still some way off, the robo-taxi market is seen as a far more viable commercial prospect in the immediate future.

In the last few months Californian/HongKong start-up AutoX announced a pilot in Shanghai where it will deploy 100 vehicles in a 150 sq.km area in the city's north-

western Jiading district. In the same district Didi is also launching a fleet of vehicles and will start trial operations with a mix of driverless and human-piloted vehicles. Both companies have been developing and testing self-driving cars in China and the US in recent years.

Another leading player, Pony.ai, has plans to expand its robo-taxi fleet to 100 vehicles by the end of 2019. It has already been offering trips with its driverless vehicles in the Nansha

district of Guangzhou, and has also struck a partnership with Toyota on a driverless mobility service.

Baidu is also rolling out its robo-taxi pilot service, Apollo Go, with 100 FAW-made vehicles in the city of Changsha. And Guangzhou-based WeRide has partnered with transportation firms Baiyun Taxi and the SCI Group to launch an autonomous ride-hailing service called WeRide RoboTaxi.



Levels of autonomy

The gradual move towards AD is represented by many different 'levels' of autonomy in a vehicle. These range from scenarios where the driver is in complete control at level 0, through to one where the driver is not expected to control the vehicle at all at level 5.

Level 1: Hands off (partially). Vehicles able to realise automated driving tasks within same lane.

Level 2: Hands off (partially). Vehicles

able to realise automated driving tasks across lanes.

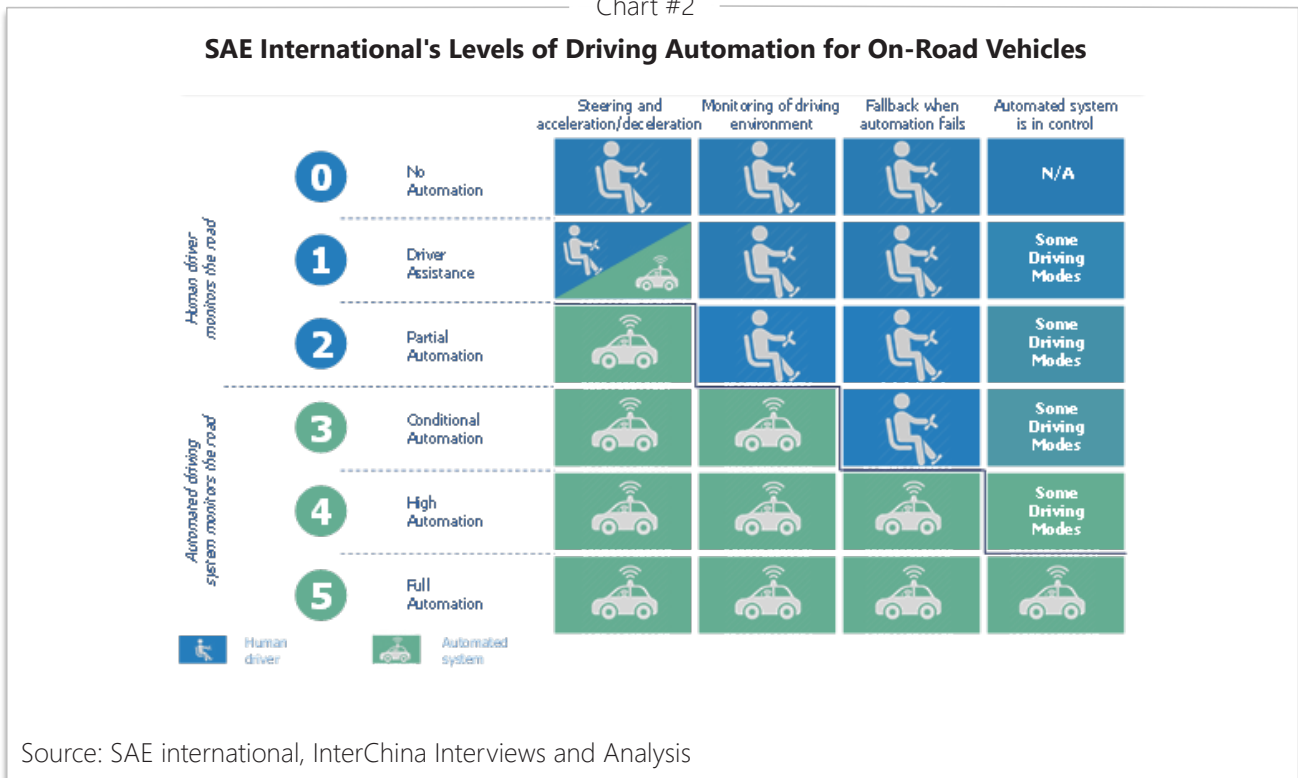
Level 3: Eyes off. System is in full charge of external environmental monitoring, but driver needs to be prepared to take back driving control once systems warn.

Level 4: Mind off. System take full charge of decision making and can respond to emergency situation, but still within a limited Operational Design Domain (ODD).

Level 5: Mind off. Autonomous driving in all conditions even out of ODD.

Much debate around AD concerns how quickly we will reach the higher levels of this scale. As mentioned, the progressive development of AD perfectly suits the robo-taxi market and the gradual opening of dedicated districts for AD operations. A bigger question is whether, ultimately, the market will be driven more by robo-taxis than by private purchases of autonomous vehicles.

Chart #2



Source: SAE international, InterChina Interviews and Analysis

The market challenge

Considerable challenges remain for all players in the market, even those with the deepest pockets.

For instance earlier last summer it was reported that General Motors would miss its target to roll out driverless cars in large numbers by the end of 2019 after its robo-car partner Cruise said more testing was needed.

At the same time leading players are contending with major infrastructure issues. For instance China faces particular challenges around its congested road infrastructure and it is no coincidence that the areas that have been covered by AD trials have tended to be in less dense suburbs. If such trials were attempted in much more congested areas with heavier traffic flows then this would add much more complexity.

This issue strikes to a wider debate about whether AD should rely on 'individual vehicle intelligence' (sensors and algorithms in the vehicle only) or whether they should rely as much on

'synergistic decision-making' whereby vehicles are assisted by external infrastructure. In other words, the sensors don't need to judge the road sign because the infrastructure will tell the vehicle. Such technology also brings with it major challenges around the whole area of data protection and cybersecurity.

Prospects for V2X in China

V2X (Vehicle to Everything) communication - which enables the passing of information from a vehicle to any entity that may affect the vehicle (such as a traffic light) - is at the heart of the technological debate around AD.

In China, our view at the moment is that the Chinese government's development of V2X (which will lead to road infrastructure upgrades) is actually more for non-AD purposes, such as for building transportation intelligence across cities via functions like traffic jam monitoring and path optimisation. In the future though, advanced V2X technologies are sure to play a significant role in AD development in China.

Prospects for LiDAR in China

The development of LiDAR (Light Detection and Ranging) in China is also worth tracking closely. Given their very high accuracy, multi-sensor solutions - which centre on LiDAR with cameras and radars - will eventually become mainstream for level 3 autonomy and above. However, such solutions are currently very costly, equivalent to a Class A sedan. Meanwhile, leading players are also engaging in develop vision systems and machine learning capabilities using multiple cameras and sensors that can capture large volumes of data.

Regulation

Meanwhile regulatory challenges, especially in terms of what happens if there is an accident when a passenger is not controlling a vehicle, remain. The arguments over where responsibility lies at different levels of autonomy - whether it's with the manufacturer, the software provider, or the passenger - continue to rage, although the development of global legal standards are progressing.

Seizing the opportunity

Despite these challenges the AD opportunity is simply too big to be ignored.

Indeed with the Chinese government committed to building 'transport intelligence' across cities, and also strongly supporting the development of AD test zones, there is a significant and growing infrastructure building up around the industry.

So could now be the time for your business to seize the AD opportunity? Is there a window of opportunity for your business given your existing portfolio and value chain? Could your company successfully tap into AD opportunities and balance medium-term uncertainty around the sector with its long-term potential? Would the likely return justify the ambition? And does AD provide the opportunity you have been waiting for to diversify your portfolio or perhaps your role in the value chain of your market?

These are all questions which we at InterChina are particularly well-placed to answer. It may be, for instance, that given the maturing AD opportunities the acquisition route may also provide a shortcut for moving into this fast-growing market in China.

As a firm we have supported a number of deals in the ADAS/AD space. For instance we advised French automotive supplier Faurecia on its acquisition of a majority stake in Jiangxi Coagent Electronics, a private company specialising in infotainment and interior electronic solutions, including the integration of digital displays and HMI (Human Machine Interfaces) technologies, which supplies leading Chinese automotive manufacturers.

Assistive technologies

In the short to medium term, ADAS (Advanced Driver-Assistance Systems) – which is level 2 or 3 autonomy, is the more mature technology and opportunity. As assistive technology gets more accurate and less dependent on human decision-making, so it will eventually evolve into AD. In the

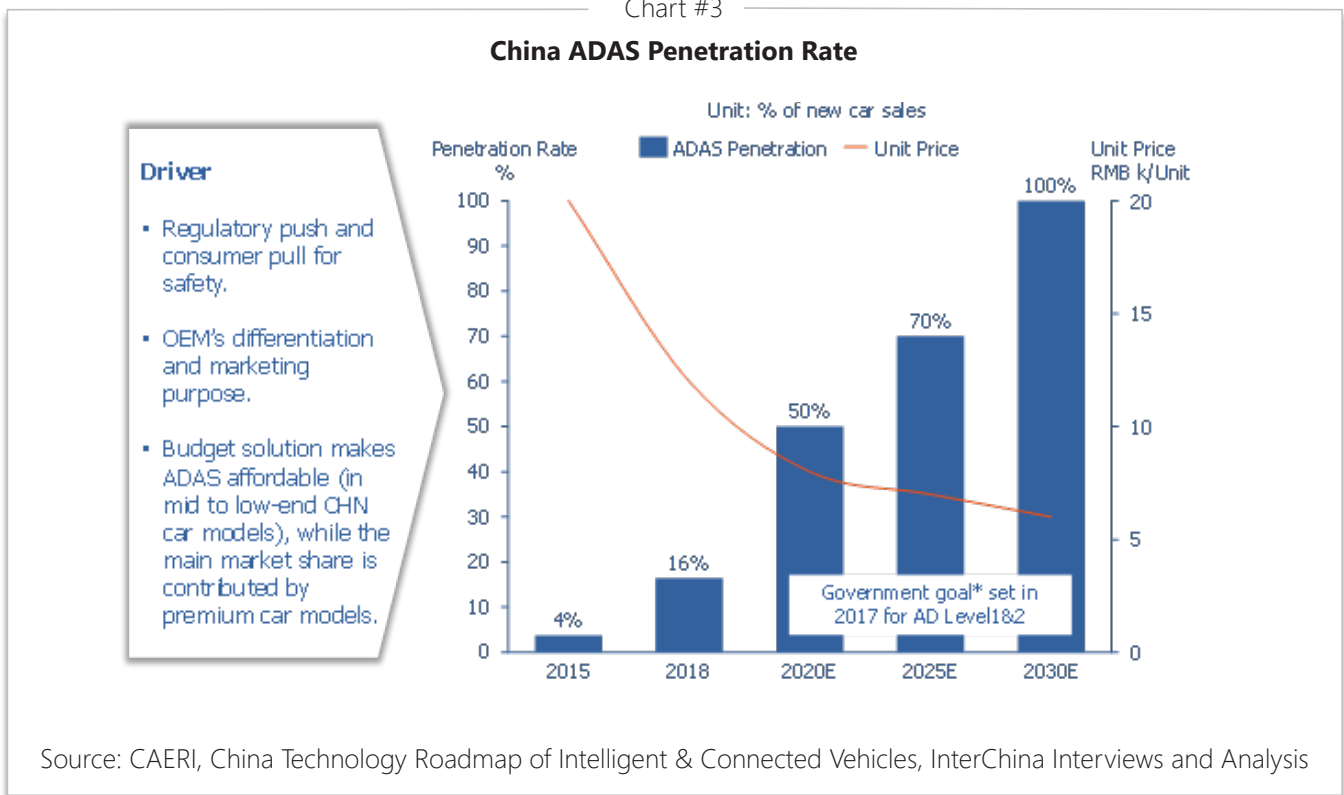
meantime ADAS is becoming a familiar concept to many drivers, while it is also affordable and becoming more widely available in low-end car models.

Much of the technological debate around ADAS will centre on sensor requirements which change at different AD levels. For instance as you head towards level 4 you need more sensors with higher accuracy, and 'sensor fusion' (i.e. the use of sensory data from multiple sources, combined into one comprehensive result) becomes critical.

To complicate matters, there are a number of methods of multi-sensor data fusion. For instance in a 'centralised' sensor fusion method raw data from each sensor is directly transmitted to a central processing unit so as to realise real-time fusion. In a 'distributed' method raw data from each sensor is processed first and then sent to a data fusion centre for optimisation. While in a 'combined' method part of the sensors use the centralised method and part use the distributed method.



Chart #3



Long-term prospects

As we have highlighted, plenty of challenges remain in the AD market, while China still has some catching up to do in terms of an overall policy framework and standardisation. For instance the US published its first national-level AD planning document back in 2012 and updated it further in 2019. while Germany has also published a strategy for

automated and connected driving and, after several revisions, has now almost completed an AD-relevant regulatory framework which is helping to solve key issues such as liability during accidents.

Indeed China, like other countries, can certainly learn from the progression of these standards, and the country is definitely moving in the right direction in terms of laying the groundwork for its own AD industry.

Success in this fast-moving and dynamic market is by no means guaranteed, is likely to take many years, and will not be easy. But that doesn't mean businesses should be afraid of the challenges and of seizing the immense opportunity.

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Simon Zhang is InterChina's Partner in Charge of Strategy Practice. He has 20+ years of management and consulting experience to successfully advise the top-line growth of both global Fortune 500 and medium sized foreign companies in China and globally. He is also leader of InterChina's Chemical and Automotive Sector Groups.

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