Autonomous Driving Simulation Industry Chain Report, 2019-2020 (I)

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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

Autonomous driving (AD) simulation: a market impossible to be ruled by IT giants
After the pioneers Baidu and Tencent in the AD simulation market, Huawei Technologies Co., Ltd follows suit and forays into it, getting small- and medium-sized players cornered.

In this report, conclusions are drawn from our insights into AD simulation.

As manufacturing is growing digital and transferring to a software-enabled industry, industrial software becomes the heart of digital manufacturing, so does for the automotive sector. Industrial software tends to be a platform facilitating industrial digitalization, networking and intelligent transformation and where small applications will run.

Industrial software segments feature complex processes, rather high thresholds and long cycles. For the IT giants, they have neither first-mover advantage nor much late-developing advantage. AD simulation software is also subject to industrial software, into which IT firms set foot and will find their incompetence, while the traditional simulation tycoons not only excel in simulation of auto parts but spare no effort in AD simulation.

It is mentioned in our study a year ago that: traditional simulation leaders keep expanding through mergers and acquisitions, boasting dozens to hundreds of product varieties that have been found in dozens of industries. For instance, ANSYS leads the pack in the CFD market, develops embedded codes, beefs up chip packaging design, and enriches internal combustion engine (ICE) simulation products through more than ten acquisitions of peers in the industry.

In 2019, ANSYS acquired British Granta Design, and American Utah-based 3DSIM, a developer of additive manufacturing (3D printing) simulation technologies. 3DSIM brings ANSYS the sole complete additive manufacturing (AM) process inside the industry. Granta Design helps to have the product portfolios of ANSYS applied to key fields. Granta Design provides customers with all kinds of important material data and enables them to visit Granta's material intelligent database system. Granta Design has products including Granta MI, a system used for enterprise material information management, and CES Slector that allows the user to grope for influence of different materials on its product behavior. Granta Design has a broad range of clients such as Airbus, General Motors, Emerson, Lockheed Martin, NASA, Saudi Aramco, and Rolls-Royce.

Traditional simulation giants builds up autonomous driving simulation technologies

Just like automakers striving to be mobility providers and recruiting software engineers aggressively, the traditional simulation companies are also improving their weaknesses. ANSYS purchased Optics in 2018 and strengthened sensor (LiDAR, camera, radar, etc.) simulation technologies, becoming a real blockbuster in the AD simulation market.

Automated Driving Toolbox of MathWorks R2019b version is added with 3D simulation support and fulfills the integrated simulation of Simulink model with the camera, LiDAR or radar sensor model in Unreal Engine, rapidly partitioning the 3D point cloud data from LiDAR.

In February 2019, Vector acquired TESIS GmbH. TESIS DYNA4 starts to be fully integrated with Vector's product lineup. The latest version of TESIS DYNA4 is added with single vertical scanning LiDAR model, supportive for the geo-reference road network of World Geodetic System WGS84, and used for simulation of GPS receiving and V2X.

In May 2019, IPG unveiled CarMaker 8.0 and rolled out sensor model LiDAR RSI, Camera RSI camera model additional with "to gain semantic segmentation image data" feature, allowing introduction and use of road network from the OpenDrive format.

The most professional Chinese testing institutions team up with overseas simulation companies to build AD simulation laboratories and provide services to domestic customers by leveraging world's state-of-the-art technologies. In February 2019, China Automotive Technology & Research Center Co., Ltd (CATARC) collaborated with IPG on building driving scenario simulation joint laboratory. In November 2019, China Automotive Engineering Research Institute Co., Ltd. (CAERI) partnered with Hexagon, NI and Konrad Technologies to jointly set up i-VISTA intelligent connected vehicle joint simulation and test laboratory.

Why can't IT giants rule the autonomous driving simulation market?

Although they are competitive in simulation software development, distributed computing, scene building, chip research and development, etc., IT giants have shortcomings as follows:

(1) As far as autonomous driving hardware is concerned, Chinese IT giants are left at least ten years behind foreign leading companies. As for autonomous driving software technology, there is a narrow gap between Chinese and foreign brands, but a wide gap of more than a decade particularly in chassis and chip. The absence of rich data about core components of vehicle and technical accumulation make it impossible to control the vehicle accurately.

(2) With regard to automotive simulation technology, Chinese IT giants are left dozens of years behind foreign leading companies. Automotive simulation is a fusion of technologies about computer graphics, multimedia, sensors, optics & display, materials, electronic semiconductors, kinetics, to name a few. Most Chinese IT firms are only familiar with a few disciplines.

(3) Foreign simulation leaders has decades of rich experience in developing customers. Once an automotive simulation client selects a certain simulation technology, it is hard to change. With loyal clientele, the traditional simulation vendors keep abreast of the real demand in real time and convert it into products and services swiftly.

(4) Autonomous driving simulation is in essence the upgrade of traditional automotive simulation. Figuratively, traditional automotive simulation has already built a 100-storey building, and only 10 storeys needing building can make it in autonomous driving simulation. Chinese IT giants can build the 101st-110th storeys but must build them on the already 100-storey, and they are enslaved. Wishing for a new building, they have to start from scratch.

So, it is useless for Chinese IT giants (except Huawei) to rebuild a simulation technology system. Even if it succeeds in building its own simulation software system, Huawei will apply the system in specific field rather than dominate the market.

Where are the opportunities for Chinese AD simulation competitors?

The aforementioned big platform and small application are the trend of industrial software (incl. simulation software). Baidu and Tencent seem to be competent enough to make big platform, but they are impossible to make a fresh start and have no choice but to join the existing simulation technology system. Tencent and Baidu with superiorities in cloud platform and HD map are improving traditional simulation technologies and products through all-round cooperation with traditional simulation technology providers on the one hand and using the newest AI and cloud computing technologies on the other hand.

For example, Baidu is improving its weakness in dynamics simulation amid introducing AADS system as concerns the 'realness' of simulation.

In July 2019, Apollo was souped up to 5.0 edition with the addition of vehicle dynamics models. Apollo 5.0 has the vehicle dynamics modeling approach (constraints in the model's complexity, precision, transferability and scalability, etc.) upgraded to the machine learning based Apollo dynamics model (high complexity, high accuracy, etc.). It is said by Baidu that the errors take a nosedive of 80% compared with the traditional modeling outcome.

The most advanced method of simulation system is to create driving scenes by using games engine. However, the CG (Computer Graphics) from the games engine rendering differs from the real scene shooting in richness and truth, degrading the performance of CG-trained autonomous driving algorithms in real scene. The AADS system, jointly developed by the University of Maryland, Baidu Research Institute and the University of Hong Kong, not only cuts the testing costs of simulation system considerably but undergoes a substantive leap in realness and scalability.

Except IT tycoons, small and medium simulation tech firms are supposed to give up big platform poise and transfer to focus on small application as an integral of the platform, in a bid to get the platform enriched and flexible use.

Beyond simulation platform, there are the AD simulation segments such as road environment simulation, traffic scene simulation, weather simulation, sensor simulation and facsimile system interface, to all of which the small and medium players can access. The opportunities here will be seen in our to-be-soon research report – Autonomous Driving Simulation Industry Chain Report, 2019-2020 (II).

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