S&P Global
Mobility

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Special Interview：Lenovo
Tech innovators in the auto space

August, 2024

Background

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Lenovo, best known in the consumer electronics and personal computer industry, is expanding its presence in the automotive industry, particularly in the field of vehicle computing. Vehicle computing involves collecting environmental and vehicle data through onboard sensing devices and processing it using algorithms to enhance the vehicle's intelligence and user experience. Lenovo leverages its expertise in computing to meet the demands of automotive intelligence and contribute to the development of intelligent vehicles. The company aims to become an enabler of the four new trends in vehicles: electrification, connectivity, smartification, and shareability. Its product strategy includes developing smart cockpit domain controllers for different vehicle models, offering solutions for the low, medium, and high-end markets. These products are based on various chip platforms, providing customers with a range of options.

Background

S&P Global Mobility

To learn more, we spoke to Donny Tang, Vice President and Head of Vehicle Computing. His areas of research focus on distributed heterogeneous fault-tolerant computing technology for the smart vehicle industry, as well as the development and application of next-generation vehicle-based edge computing platforms. Donny joined Lenovo Research in 2022. Leveraging Lenovo's deep understanding of computing technologies, which are derived from more than 30 years of research and development in the computer industry, and its world-leading supply chain and manufacturing capability, Donny and the Vehicle Computing Lab explore high-performance, high-reliability, high-safety & security and high-credibility smart vehicle technologies and solutions. Before joining Lenovo, Donny worked on research and development of autonomous driving, augmented & virtual reality, media steaming playback and smartphone semiconductors for Intel, iQiyi and Flex. He built multiple start-up businesses in these companies and co-founded two start-up companies, an experience that helped shape his business-oriented technical thinking. Donny entered the Computer Department at Harbin Institute of Technology in 1996 and received his bachelor's and master's degrees in Computer Science & Technology there, during which time his research areas were fault-tolerant computing systems and wearable computing systems.

Key takeaways

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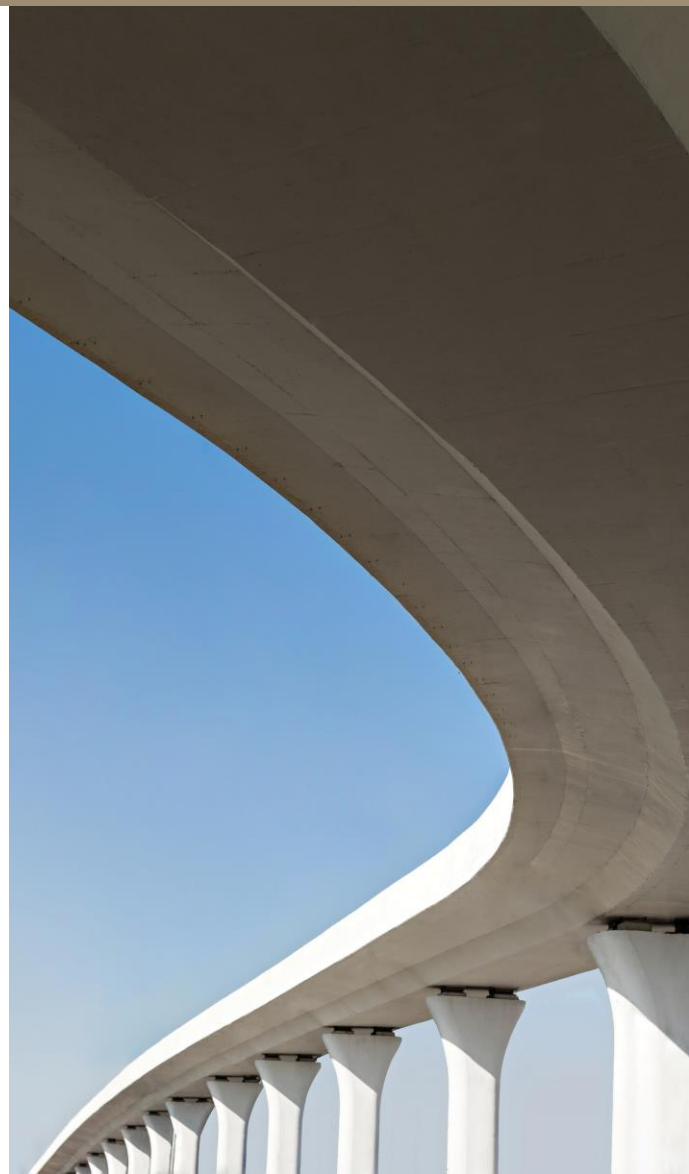
- Collaboration between the technology and automotive industries is paramount for mutual learning and advancement. In the next 5-10 years, the ability to learn quickly and effectively from each other will be key to success. It is not a competition, but a collaborative effort to leverage strengths and drive innovation.
- Large language models have the potential to revolutionize the automotive industry by enhancing the driving experience and improving productivity for automakers. These models can better understand driving situations, collect information from the cabin, and assist in complex car feature explanations and design decisions.
- The rise of mobility-as-a-service gives consumers the option to choose between owning a car or paying for mobility services. While some argue that driverless cars will be expensive, it is important to note that as computer power prices decrease, more affordable options for Level 4 and Level 2++ automated driving vehicles will coexist.



Question 1

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S&P Global Mobility:

Could you share an overview of Lenovo’ s strategy, involvement, and motivation in the automotive industry, particularly around the areas of the cloud, vehicle experience, and autonomous driving?

Lenovo:

The automotive industry has witnessed significant changes in the past 5-10 years, with a shift from traditional engines to electrification, smart car applications, smart cockpits, and autonomous driving. These disruptive technologies have led to a transformation in the industry's value chain. Electrification and intelligence are key drivers of this change. Lenovo, with its expertise in ICT and consumer electronics, focuses on enhancing the vehicle experience and smart car technology. Lenovo's goal is not to manufacture cars but to collaborate with automakers and technology companies in designing better smart cars and trucks. Lenovo leverages its branding, information, and communication technology to support automakers in this endeavor.

Question 2

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S&P Global Mobility:

How does the nature of collaboration between Lenovo and your automotive customers differ from other industries?

Lenovo:

Lenovo, primarily known as a laptop company, has made significant progress in the computing industry over the past 40 years. According to financial reports, Lenovo's non-PC business now contributes more than 40% of its revenue, with a strong focus on software and solutions. One of Lenovo's key non-PC businesses is scenario computing, which involves designing hardware and software for various application areas such as insurance, agriculture, and banking.

In the automotive industry, Lenovo has established partnerships with numerous companies, providing laptop services, cloud services, and storage solutions. Many automotive companies already use Lenovo's IT technology in their operations. Lenovo is now venturing into vehicle computing, aiming to provide integrated products for the automotive industry. The goal is to incorporate Lenovo's technology directly into the vehicle system, enhancing its functionality and performance.

Question 3

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S&P Global Mobility:

With the emergence of Chinese suppliers and increased collaboration between tech companies and automakers, how do you anticipate the collaboration landscape to evolve in the future, and what opportunities could this create for further partnerships and innovations?

Lenovo:

The technology industry and the automotive industry are both applying computer technology in their respective fields. Just as e-commerce applies computer science to retail, the automotive industry is leveraging computer technologies for in-car applications, similar to an office environment. Collaboration between these industries is crucial for learning from one another. Technology companies entering the automotive sector need to understand the automotive supply chain and the mechanisms within vehicles.

On the other hand, automakers can learn from technology companies to enhance the digital experience in future car generations. In the next 5-10 years, the key to success will be the ability to learn quickly and effectively from each other. It is not a matter of one industry winning over the other, but rather who can learn faster and better from one another.

Question 4

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S&P Global Mobility:

How do you see large language models (LLMs) transforming the automotive industry and its business models? What potential applications could we anticipate in the automotive sector?

Lenovo:

The concept of large language models is indeed inspiring, as it opens up new possibilities for computers to work alongside humans and create something new. In the automotive industry, large language models can be leveraged to enhance the driving and smart cockpit experience. Companies like Tesla have already integrated large language models into their cars, allowing for better understanding of driving situations and collecting information from the cabin to understand the driver's intentions.

Lenovo is also exploring the use of large language models in the cabin to better serve the driver and occupants, leveraging its expertise in human-machine interaction from PC, laptop, and cell phone technologies. Additionally, large language models can enhance the productivity of automakers, helping consumers better understand complex car features and assisting designers in making design decisions and balancing costs. Lenovo's AI for All project aims to bring AI products from different industries into the automotive sector to benefit from this technology.

Question 5

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S&P Global Mobility:

How does Lenovo's vehicle computing roadmap, featuring products like the XH1 and AH1, contribute to the advancement of advanced driver assistance system (ADAS) and autonomous driving technologies? Can you provide more details about the autonomous driving domain controllers AD1 and AM1? How do they contribute to the advancement of autonomous driving technologies?

Lenovo:

AI has the potential to benefit all industries by designing applications that help people leverage new technologies. In the automotive industry, there are several key areas where AI can make a huge impact. Firstly, end-to-end algorithms can be used to achieve faster response times and improve overall performance.

As ADAS and autonomous driving features become more complex, AI can also be used to enhance basic functions such as adaptive cruise control and lane keeping, as well as develop advanced capabilities like real-time object recognition for city driving.

Over-the-air (OTA) updates are also important for keeping smart features up to date, with some brands offering monthly updates. To support these advancements, car computers are required. Lenovo is collaborating with companies like Nvidia, Qualcomm, and TI to develop automotive-grade solutions. These include the AD1 whose AI computing power exceeds 2000 TOPS@INT8 and achieves the process of bring-up for Level 4 applications like Robotaxis and Robotrucks, the AH1 and AM1 for Level 2++ ADAS and city NoA focus, and the XH1 for central computer management. Lenovo also offers rear-seat entertainment systems for luxury brands, providing software and ecosystem support for activities like music, storytelling, videos, and gaming.

Question 6

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S&P Global Mobility:

Considering the gradual progression towards fully autonomous driving, how do you anticipate the dynamics of car ownership, car-sharing, and in-car entertainment to change, especially with the emergence of streaming and gaming services in electric vehicles?

Lenovo:

Companies in the mobility services industry may need to wait a few more years for autonomous driving technologies to mature. However, this waiting period provides an opportunity to explore new applications and possibilities for when driverless technologies become more prevalent. For example, people could use their time in the car to have breakfast or reply to emails, turning the car into a "third living room" alongside home and office spaces.

The rise of mobility-as-a-service means that consumers will also have the option to choose whether to own a car or simply pay for mobility services. While some argue that driverless cars will be too expensive for consumers, it is important to note that as computer power prices decrease in the future, Level 4 and Level 2++ automated driving vehicles will coexist with more affordable options.。

Question 7

S&P Global Mobility

S&P Global Mobility:

What are your long-term objectives in securing a significant market share in the automotive industry, particularly with the advent of autonomous driving and software-defined vehicles?

Lenovo:

Lenovo's long-term objectives in the automotive industry are to support automakers in designing and manufacturing smart cars, as well as providing both in-car and out-of-car intelligence. This includes developing smart cockpit applications and smart driving applications. The integration of in-car and out-of-car intelligence will allow Lenovo to provide comprehensive solutions to its clients. This is a key advantage for Lenovo in the automotive industry.

Question 8

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S&P Global Mobility:

As vehicles evolve to become software-defined, there is a potential for recurring software revenue. How do you plan to leverage this opportunity, and what monetization strategies are you considering in the automotive software market?

Lenovo:

The concept of software-defined vehicles represents the convergence of the automotive industry and the IT industry, bringing together two sectors that are traditionally different from each other. The development of cars is following a similar trajectory as the history of the IT industry, with the supply chain segmenting horizontally. This includes platform suppliers, OS providers, application software providers, and system integration suppliers. Tier 1 suppliers are shifting to different segments, and some companies are offering licenses and car services that operate on a subscription model, similar to smartphones today. The adoption of information and communication technology in the automotive industry varies in speed across the global market, presenting a learning curve for companies. Lenovo, with its presence in 90 countries, is well-positioned to assist companies in designing smart cars and navigating this evolving landscape

Moderator

S&P Global Mobility

Matthew Beecham

AutoTechInsight Research Manager,
Supply Chain & Technology,
S&P Global Mobility

Matthew Beecham is a research manager for S&P Global Mobility's AutoTechInsight platform.

Matthew brings almost three decades of industry knowledge and an extensive network to his role. His expertise spans ATI domains, providing shop floor insights and conducting high-level interviews.

He has worked for GlobalData plc, Just Auto, HORIBA MIRA, Economist Intelligence Unit (EIU), McKinsey, AT Kearney, and Supplier Business, a predecessor of ATI.

Matthew's academic credentials include a PhD in Automotive Technology Transfer from Cranfield University.

Fanni Li

Principal Research Analyst,
Automotive Supply Chain & Technology,
S&P Global Mobility

Fanni is Principal Research Analyst focused on Connected Car and related technology at S&P Global Mobility. Her responsibilities include China market research and analysis of digital cockpit and connected car, as well as global market analysis of over the air updates, connected services and vehicle software paid updates.

Fanni has more than 10 years working experience in automotive industry with engineering background. Prior to joining S&P Global, she worked for global OEM engineering centre in China for several years focusing on project management and product development of infotainment domain products.

Fanni holds a Master of Engineering in Mechatronic System from University of Technology of Compiegne in France, along with an MBA from University of Canberra.

Partner

S&P Global Mobility

Donny Tang

Vice president and head of vehicle computing

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Corporate Profile

S&P Global Mobility

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S&P Global Mobility enables customers to anticipate change and make decisions with conviction.

We help them to optimize their businesses, reach the right consumers, and shape the future of mobility. Leveraging technology and data science, we provide unique insights, forecasts and advisory services spanning every major market and the entire automotive value chain—from product planning to marketing, sales and the aftermarket.

With a legacy dating back to the 1920s when R. L. Polk published the first vehicle registration reports, our solutions are used by nearly every OEM, more than 95% of tier one suppliers, media agencies, governments, insurance companies, and financial stakeholders to provide actionable insights that enable better decisions and better results.

Lenovo

Lenovo leverages its expertise in computing to meet the demands of automotive intelligence and contribute to the development of intelligent vehicles. The company aims to become an enabler of the four new trends in vehicles: electrification, connectivity, smartification and shareability. Its product strategy includes developing smart cockpit domain controllers for different vehicle models, offeringsolutions for the low, medium and high-end markets. These products are based on various chip platforms, providing customers with a range of options.

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