## Mobility of Tomorrow:
## When a Car is More Than Just a Car



Cars are becoming smarter, introducing a new dimension to the world of "mobility." However, amidst a plethora of fancy terms, what exactly is the future mode of mobility? What problems does it aim to solve? It is something worth delving into further. When we discuss "future mobility," do images of KITT, the AI sidekick from the TV show Knight Rider, or the autonomous vehicles from the movie Minority Report come to mind? While humanity is slowly turning science fiction scenarios into reality, the challenges in the real world are far from simple. First and foremost, we must understand why there is a need for new modes of mobility.

### Human Driving Is Risky: Navigating the Path Forward for Autonomous Driving

The continuous evolution of automotive technology is primarily driven by the fact that human driving is too dangerous. According to the World Health Organization, approximately 1.19 million lives are lost to car accidents globally each year. Moreover, in most countries, the economic loss caused by traffic accidents amounts to about 3% of the national GDP. To reduce fatal accidents, automotive technologies keep advancing. The ultimate goal is to achieve fully autonomous driving so as to eliminate deadly traffic incidents caused by drunk driving, fatigue, distraction, or unfamiliarity with road conditions. The discussion about the future of mobility inevitably begins with autonomous driving. As of 2024, global research and development in autonomous driving can be broadly divided into two camps: the "LiDAR and HD maps" faction, led by technology giants and established automakers, and the "vision-based" faction, represented by Tesla and an increasing number of Chinese automakers. "Chinese automakers and automotive technology developers have recently shown a trend of moving away from the dependence on HD maps," said TrendForce analyst Caroline Chen. "These companies include Huawei, XPeng, Li Auto, and Pony.ai, all of which have launched urban driving assistance systems that do not require HD maps."

Chen pointed out that the high cost of HD maps, which have an error margin of less than one centimeter and a production cost of more than TWD 1,000 per kilometer, is the main reason automakers are gradually leaving this technology and searching for better alternatives.

The vision-based faction, led by Tesla, believes that increasing computing power and advances in software can synergize with sensors that are equal to or better than human vision. When this is achieved, computers can have the same driving ability as humans without being affected by physiological factors, thereby significantly reducing the risk of accidents.

Looking at the HD maps faction, Waymo, which is supported by Google, is its leader as it has made impressive achievements with this technology. Waymo's autonomous taxi fleets are already operational in several US cities, including Phoenix, San Francisco, and Los Angeles. They have performed well with an extremely low number of accidents. However, this success story has been overshadowed by the issues that GM is facing in the development of its Cruise series of autonomous vehicles. Cruise, which also uses HD maps, has been suspended from road testing due to the frequent accidents it caused in San Francisco.

## Key Components for Mobility of the Future

Although Taiwan does not have any major automakers leading the development of autonomous driving technologies, there are opportunities for local companies in the related supply chain. Autonomous driving essentially comprises the following three things: software, sensors, and electronic control components. Numerous Taiwan-based companies specialize in the development and provision of the latter two.

"Within a few years, autonomous driving software will grow rapidly, and the number of vehicles capable of reaching Level 3 to 4 autonomy will significantly increase," Chen said. Although automakers have yet to achieve the higher levels of autonomous driving, they are quietly engaging in a competition to secure greater computing power. This strategy aims to prevent a potential scenario where hardware capabilities cannot keep up with the pace of software development. In fact, automakers are equipping their new vehicles with as much computing power as possible, even if it is not required at the moment. By doing so, they can later enhance the functions and features of their vehicles through over-the-air (OTA) software updates, thereby ensuring the market competitiveness of their products. Despite the recent surge in demand for automotive components, analysts have pointed out that in the evolving industry ecosystem, which is leaning towards software-driven vehicle development, the demand for standardized components is gradually shrinking. Conversely, there has been significant growth in demand for customized components and parts. If Taiwan-based suppliers can leverage their flexibility and speed, they will be able to enter the supply chains of major automotive companies during this latest transition.

It is also worth noting that while the ultimate goal of fully autonomous driving has yet to be achieved, automakers have already recognized changes in the industry ecosystem. The traditional product development cycle of "minor modifications every three years and a major overhaul every eight years" is no longer suitable as vehicles need to be upgraded at a much faster pace to keep up with the latest technology trends. Moreover, as the computing power of onboard processors increases, the functionality of vehicles also expands.



COMPUTEX, a global leading AIoT & startup show, with the theme "Connecting AI" this year.

This has prompted automakers to shift their focus towards software as a source of profit.

Many automakers are now planning to offer subscription-based services, encouraging vehicle owners or operators to pay to unlock a variety of functions and features. For example, Kia's EV9 comes with the option to purchase special patterns/animations for the headlights and displays. Mercedes-Benz and Porsche are working to develop a market for third-party automotive apps, thus replicating the existing ecosystem for mobile/smartphone apps. BMW came under the spotlight recently for locking certain features behind a paywall, such as heated seats and steering wheels. However, the company has since reverted the decision to make certain features a paid subscription service due to market feedback.

As established automakers explore ways to monetize automotive software, Tesla, which is leading the trend of software-based cars, offers "Full Self-Driving" (FSD) software for a price in excess of TWD 220,000. Tesla also provides a "Premium Connectivity Service" that enables its vehicles to access 4G networks, although the company has yet to start charging for this service.

## Technologies and Business Models Fuel New Imaginations about Mobility

Aside from automakers exploring new avenues for revenue and profit, car owners also have opportunities to benefit economically from the latest technological advancements. Even though Uber's business model for car sharing has been constrained by regulations and is gradually transforming into a ride-hailing service, these mobile service platforms have introduced a new strategy known as "shared car rentals." Under this model, car owners can rent out their vehicles to others when they are not using them. After all, when car owners are working in office buildings or sleeping in their homes, their vehicles are idle assets that depreciate over time. By leveraging software, the internet, and smart vehicle unlocking technology, they can turn their vehicles into a source of passive income.

This idea can be taken further, leading to the creation of an "autonomous taxi fleet" that individual vehicles can join when their owners are not driving them. Computers will drive the vehicles to pick up passengers for a period, and then return to the owners' homes or workplaces to pick them up when needed. Car owners will not only save on parking fees but also receive a portion of the taxi fare earned by their vehicles. At the same time, fleet operators save on the cost of purchasing vehicles, thereby creating a win-win situation.

Forty years ago, humanity envisioned future cars as companions that could pick up their owners on their own. Today, autonomous vehicle fleets are capable of doing just that. However, vehicles of the future are expected to do much more than simply transport people from one place to another. They are evolving into hubs for entertainment, work, and personal assistance. But before we reach that stage, is there a possibility that we could first eliminate the nightmare of highway congestion? Perhaps that day is closer than we think.

COMPUTEX 2024 is scheduled to take place from **June 4th to 7th at the Taipei Nangang Exhibition Center Halls 1 and 2**. With the theme "Connecting AI," this year's exhibition will focus on showcasing the latest global AI technologies and industry trends. The event is expected to attract **1,500** international and local exhibitors, utilizing **4,500** booths across six major areas: AI Computing, Advanced Connectivity, Future Mobility, Immersive Reality, Sustainability, and Innovations. International **visitor registration opens in March**. Visitors from all industries are welcome to participate and experience Taiwan's exceptional AI strength.

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