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BYD's Layout in Electrification, Connectivity, Intelligence and Sharing and Strategy Analysis Report, 2023-2024

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BYD deploys vehicle-mounted drones, and the autonomous driving charging robot market is expected to boom

Insight: BYD deploys vehicle-mounted drones, and the autonomous driving charging robot market is expected to boom.

BYD and Dongfeng M-Hero make cross-border layout of drones.

In recent years, as vehicle intelligence and civilian drone technology and regulations became mature, drones have also been mentioned by ever more OEMs. They have made the layout by way of cross-border cooperation with drone companies. Recently, BYD, Tesla and Dongfeng among others have announced their drone solutions based on their production models.

In January 2024, BYD and DJI announced a cooperative drone solution and a plan of investing RMB5 billion, which will be implemented in phases in the years to come. The first model to be equipped is Yangwang U8 Player Edition. With the navigation system, sensor technology and intelligent control algorithms, the drone enables such functions as autonomous takeoff and landing, automatic cruise control, and intelligent obstacle avoidance.

The exclusive drone module co-developed by BYD and DJI provides a landing platform on the vehicle roof

The exclusive drone module co-developed by BYD and DJI provides a landing platform on the vehicle roof. The drone can be flown here to detect routes, and can also become a companion of off-road vehicles to check road conditions at any time. During recovery, the drone hangar on the roof is opened to reveal the landing platform. The recovery device will fix the drone, and also replace its battery through the mechanical structure to achieve continuous use of the drone.

Yangwang U8 Player Edition will be equipped with this drone system, with 3 backup batteries, in-car video monitoring and a hangar for charging the drone battery outside the car. This system consists of hangar assembly, drone, battery, remote sensing module, remote control handle, and vehicle flight control APP. It has multiple functions such as one-button takeoff, intelligent follow, one-button photography, and one-button landing.

After taking off, the drone will automatically lock the vehicle and enter the intelligent following state, with a maximum following speed of 50km/h, and also has automatic omnidirectional obstacle avoidance function. As for the photography mode, it carries three camera movement templates: adventure, lightness, and epic.

DJI Automotive introduced a LiDAR-vision system

In August 2023, Dongfeng M-Hero announced a drone solution in cooperation with GDU Technology. M-Hero 917 is equipped with Oriental Hawkeye drone system. With dual infrared and visible light channels and the road monitoring function, GDU Technology's S400 drone can survey environmental information such as road terrain, slope and angle. It supports synchronous intelligent path planning, and has a mounting capacity of 3 kg.

Dongfeng M-Hero 917 & GDU Technology S400 UAV

Source: GDU Technology

Use drone technologies for data acquisition and simulation

Use drone technologies for data acquisition and simulation

Among the three autonomous driving data acquisition methods, acquisition by vehicles is the most common, but the proportion of effective data is low, and it is easy to interfere with real behaviors of surrounding vehicles, and it is unable to record data in blind spots of sensors. Another method is acquisition in field, with low flexibility and insufficient reliability, a result of angle skew and low image accuracy.

According to the in-depth research by fka, the automotive technology research institute of RWTH Aachen University, and DJI Automotive's own practices in the past two years, aerial survey data acquisition by drones has obvious advantages. Drones can collect richer and more complete scenario data, and can directly collect aerial objective shots of all vehicles in blind spots of the target vehicle without obstruction, reflecting more realistic and interference-free human driving behaviors, and more efficiently collecting data in specific road sections and special driving scenarios, for example, on/off-ramps and frequent cut-ins.

Three Natural Traffic Data Acquisition Methods and Typical Driving Scenario Extraction Methods

Source: DJI Automotive

Why does the implementation of vision-only autonomous driving suddenly accelerate?

Why does the implementation of vision-only autonomous driving suddenly accelerate?

Why has the pace of implementing vision-only technology solutions suddenly quicken since 2024? The answer is foundation models. The research shows that a truly autonomous driving system needs at least about 17 billion kilometers of road verification before being production-ready. The reason is that even if the existing technology can handle more than 95% of common driving scenarios, problems may still occur in the remaining 5% corner cases.

Generally, learning a new corner case requires collecting more than 10,000 samples, and the entire cycle is more than 2 weeks. Even if a team has 100 autonomous vehicles conducting road tests 24 hours a day, the time required to accumulate data is measured in "hundred years" - which is obviously unrealistic.

Foundation models are used to quickly restore real scenarios and generate corner cases in various complex scenarios for model training. Foundation models (such as Pangu model) can shorten the closed-loop cycle of autonomous driving corner cases from more than two weeks to two days.

Currently, DJI Automotive, Baidu, PhiGent Robotics, GAC, Tesla and Megvii among others have launched their vision-only autonomous driving solutions. This weekly report summarizes and analyzes vision-only autonomous driving routes.

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