NEXCOM
The Intelligent Systems

White Paper

Connected Cars and Big Data Set Creative Intelligent Transportation Wheels in Motion

Connected cars and big data are driving many new businesses and opportunities, from creating more intelligent transportation applications and custom-tailored insurance models to redefining automotive designs.

According to a US-based research institute forecast, by 2020, 36% of car insurance will be converted to usage-based insurance (UBI) where insurance costs are calculated based on individual driving behavior. Some described this custom-tailored car insurance model a disruptive innovation comparable to Uber and Zipcar; this alone shows that the connected car and big data represent golden opportunities for businesses.

The technology behind intelligent transportation primarily centers on leveraging data gathered from a wide array of sensors in vehicles and on roadsides. The data is extracted, processed and converted into meaningful information through big data analytics, and delivered to people, vehicles and roadside infrastructures interconnected by communication systems to improve on-road interactions, transport safety and travel comfort. One of the most vital technologies powering intelligent transportation is the connected car.

Today, the combined strengths of the connected car and big data not only have created various intelligent transportation applications, but also redefined automotive designs, opening up many new business models and opportunities.

The Connected Car Redefining Automotive Designs

Tony Chiu, Product Division Manager of NEXCOM's Mobile Computing Solutions Business Unit, states that an increasing number of innovations in the automobile industry are on the horizon, bringing new capabilities to intelligent vehicle applications. Furthermore, the advancement of sensor technology and the increase use of different types of sensors in vehicles have enabled a greater degree of detection accuracy. For example, accelerometers with robust thermal stability paired with gyroscope can now more accurately calculate the angular velocity of vehicles to increase the precision of motion detection and control.

In addition, the combined use of in-vehicle sensors and cameras can enable advanced driver assistance systems (ADAS) to provide drivers alert information such as relative speed and distance to other vehicles or entities to avoid collisions or even actively apply brakes before impacts. This inclusion of active ADAS will enable vehicles to shift from passive safety systems into the realm of active safety systems, significantly reducing the potential rate of accidents with proactive measures.

Using the timing of a braking system as an example, Chiu explains, "ADAS will first operate in 'semi-active' mode and warn the driver about an imminent collision. If no action is taken by the driver, ADAS will actively take over control of the brakes. However, understanding the brake intervention time is an intricate task as it relies on sensors and cameras to collect data on the vehicle speed, road smoothness and weather conditions, and then carefully examine the information to calculate the appropriate time of intervention. NEXCOM in-vehicle computers have, on numerous occasions, taken on the role for algorithm development for many simulated ADAS applications in a range of vehicles, from passenger cars to large mining trucks."

Compared to smaller passenger cars, large mining trucks contain larger vehicle parts and are often located in large mining sites where any event of vehicle breakdown can be serious. To provide safety, in-vehicle computers can also be used for ADAS to ensure mining trucks travel within safe distances. Furthermore, in-vehicle

computers integrated with sensors can detect pupil dilations, eyelid movements and head tilt angles to determine driver's mental awareness. If signs of drowsiness are detected, in-vehicles can activate seat vibrators to keep driver's attentiveness in check.

NEXCOM's in-vehicle computers have branched out into agricultural equipment as well. Used on driverless farm tractors in a similar manner to ADAS on passenger cars, NEXCOM in-vehicle computers provided tractors with precise route directions to accurately guide tractors throughout the fields without traversing out of path to prevent crop damages, while also ensuring tractors accurately perform land preparation, plantation, fertilization, irrigation and other farming operations.

New Business Models for Value-added Business Transformation

Chiu observes that one of the most clear examples of new business models driven by the connected car and big data is UBI. UBI uses on-board diagnostics (OBD) information to analyze driver's driving pattern to determine relevant risk factors and associated insurance costs, diverging away from traditional age-based pricing. However, with insurance companies now promoting UBI, it is often more ideal to outsource UBI implementation to a third-party vendor compared to developing UBI internally as it involves high hardware and software cost. Third-party vendors can offer a cost-effective and complete hardware and software UBI solution with relevant data to insurance companies. This model of approach alone is enough to spur many other new business models.

In addition to the emerging UBI transition, Chiu envisions that other new business models will continue to develop. The most notable one to take note of is Product as a Service (PaaS), as it represents a blue ocean opportunity for businesses competing in the red ocean. This opportunity gives providers of fleet management systems, taxi infotainment services and car interiors the chance to transform from pure hardware vendors into value-added service providers to capitalize on a stream of maintainable earnings.

Founded in 1992, NEXCOM integrates its capabilities and operates six global businesses, which are IoT Automation Solutions, Intelligent Digital Security, Internet of Things, Interactive Signage Platform, Mobile Computing Solutions, and Network and Communication Solutions. NEXCOM serves its customers worldwide through its subsidiaries in five major industrial countries. Under the IoT megatrend, NEXCOM expands its offerings with solutions in emerging applications including IoT, robot, connected cars, Industry 4.0, and industrial security.

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