Vehicles that drive themselves

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The thought of a car or truck that can drive itself is at once both exciting and frightening. Autonomous vehicle navigation, as the technology is known, may make life more convenient if it allows people to kick back and enjoy a good book or movie while their cars guide themselves through rush-hour traffic. But what happens if it starts to rain or if traffic suddenly picks up? If the technology is to work at all, it will have to be completely safe on all roads, under all speeds, and in all weather. Therein lies the challenge: if cars and trucks are to drive autonomously, they will need futuristic sensors and advanced computing capabilities to respond to ever-changing road conditions.

Perhaps the most extreme example of ever-changing conditions is a war zone, where roads may be reduced to rubble and vehicles are natural targets of attack. Rolling out fleets of self-navigating vehicles for the military is an enticing idea because it could keep thousands of troops out of harm's way. But will it be possible for these vehicles to operate in war zones? This question was the inspiration for a recent Defense Advanced Research Projects Agency (DARPA) contest aimed at spurring the development of such technologies.

Held at a former air force base in Victorville, Calif. in late 2007, the DARPA Urban Challenge offered a $3.5 million purse to competitors who could design the fastest and safest vehicles that could traverse a 60-mile urban course in moving traffic in less than six hours. The contestant vehicles were unmanned and had to complete a simulated military supply mission, maneuvering through a mock city environment, avoiding obstacles, merging into moving traffic, navigating traffic

circles, and negotiating intersections -- all while conforming to California driving rules. Of the 89 international teams that entered the challenge, only six finished in the allotted time.

Wende Zhang of General Motors was part of the team that designed the winning vehicle, which finished with the fastest time -- an average speed of approximately 13 miles per hour. The GM team drew upon existing technology already offered in some of their vehicles that can assist in parking or detect lane markers and trigger alarms if the drivers are coming too close to the shoulder of the road. For the DARPA challenge, they developed a more sophisticated package of sensors that included GPS coupled with a camera and a laser-ranging LIDAR system to guide and correct the vehicle's route through the city. In Baltimore, Zhang will present GM's patented new methods for detecting lanes and correcting a vehicle's route, which helped them win the challenge.

Though they won, don't look for robotic chauffeurs immediately. The technology must prove reliable in many different road, weather and lighting conditions. Still, says Zhang, a commercially-viable autonomous driving product may be available in the next decade.

Wende Zhang will present these results at the 2009 Conference on Lasers and Electro-Optics/International Quantum Electronics Conference (CLEO/IQEC) May 31 to June 5 at the Baltimore Convention Center in Baltimore.

Source: Optical Society of America (news : web)