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Autonomous Cars: Future or Reality?

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If there's one topic that gets a lot of attention lately in the media, the public policy sphere, and in general health and wellness discussions, it is how to make the roadways safer. According to the Centers for Disease Control, fatalities from traffic incidents happen on an annual basis upwards of 33,000 people [1]. Many of these accidents are preventable, and an alarming number of them are a result of distracted driving.

In the past few years, as a result of the number of traffic accidents plaguing the country and the devastating injuries and fatalities that result from them, a greater push has been made in the sphere of technology to make cars safer, drivers more aware, and accidents less likely [2]. So there are many ways to make car trip safer, and now we can watch the development of autopilot cars. An autonomous car and unmanned ground vehicle is a vehicle that is capable of sensing its environment and navigating without human input [3]. Autonomous cars use a variety of techniques to detect their surroundings, such as radar, laser light, GPS, odometer and computer vision. Advanced control systems interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage. Autonomous cars must have control systems that are capable of analyzing sensory data to distinguish between different cars on the road. The potential benefits of autonomous cars include reduced mobility and infrastructure costs, increased safety, increased mobility, increased customer satisfaction and reduced crime. Autonomous cars are predicted

to increase traffic flow; provide enhanced mobility for children, the elderly, disabled and the poor; relieve travelers from driving and navigation chores; lower fuel consumption; significantly reduce needs for parking space; reduce crime; and facilitate business models for transportation as a service, especially via the sharing economy. This shows the vast disruptive potential of the emerging technology. In spite of the various benefits to increased vehicle automation, challenges exist, such as technology challenges, disputes concerning liability, resistance by individuals to forfeit control of their cars, customer concern about the safety of driverless cars, implementation of a legal framework and establishment of government regulations; risk of loss of privacy and security concerns, such as hackers or terrorism; concerns about the resulting loss of driving-related jobs in the road transport industry; and risk of increased suburbanization as travel becomes less costly and time-consuming. Many of these issues are due to the fact that autonomous objects, for the first time, allow computers to roam freely, with many related safety and security concerns. As we see nowadays tested autopilots are not safe due to it's dependence of road situation. If the road is full of different sudden objects, they can mislead sensors, so autopilot's programme may react wrong. A classification system of autopilots based on six different levels (ranging from fully manual to fully automated systems) was published in 2014 by SAE International, an automotive standardization body, as J3016, Taxonomy and Definitions for Terms Related to On-Road Motor Vehicle Automated Driving Systems [4]. This classification system is based on the amount of driver intervention and attentiveness required, rather than the vehicle capabilities, although these are very loosely related.

Level 0: Automated system issues warnings and may momentarily intervene but has no sustained vehicle control.

Level 1 (”hands on”): Driver and automated system shares control over the vehicle. An example would be Adaptive Cruise Control (ACC) where the driver controls steering and the automated system controls speed. Using Parking Assistance, steering is automated while speed is manual. The driver must be ready to retake full control at any time. Lane Keeping Assistance (LKA) Type II is a further example of level 1 self driving.

Level 2 (”hands off”): The automated system takes full control of the vehicle (accelerating, braking, and steering). The driver must monitor the driving and be prepared to immediately intervene at any time if the automated system fails to respond properly. The shorthand ”hands off” is not meant to be taken literally. In fact, contact between hand and wheel is often mandatory during SAE 2 driving, to confirm that the driver is ready to intervene.

Level 3 (”eyes off”): The driver can safely turn their attention away from the driving tasks, e.g. the driver can text or watch a movie. The vehicle will handle situations that call for an immediate response, like emergency braking. The driver must still be prepared to intervene within some limited time, specified by the manufacturer, when called upon by the vehicle to do so. The 2018 Audi A8 Luxury Sedan was the first commercial car to claim to be able to do level 3 self driving. The car has a so-called Traffic Jam Pilot. When activated by the human driver, the car takes full control of all aspects of driving in slow-moving traffic at up to 60 kilometers per hour. The function works only on highways with a physical barrier separating oncoming traffic.

Level 4 (”mind off”): As level 3, but no driver attention is ever required for safety, i.e. the driver may safely go to sleep or leave the driver's seat. Self driving is supported only in limited areas (geofenced) or under special circumstances, like traffic jams. Outside of these areas or circumstances, the

vehicle must be able to safely abort the trip, i.e. park the car, if the driver does not retake control.

Level 5 (”steering wheel optional”): No human intervention is required. An example would be a robotic taxi.

Nowadays cars are coming more completed by using different safety systems such as Brake Assistant, Park Assistant, Automated Cruise Control (ACC) and etc., so they don’t need smooth driver’s reaction or any other specific driving skills, and we can attribute it to level 2 [5]. It means that in the near future cars will be automated for about 90%, and as result the number of human losses will decrease rapidly.

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