

Approaches to Autonomous Driving Vehicle Traffic Accidents Liability in China

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Abstract: Autonomous driving technology, as another major revolution in the field of transportation technology, brings new challenges to the provisions of the current legal system. Whether the autonomous vehicle can become the subject responsible for traffic accidents, whether the manufacturer of autonomous vehicle should bear the responsibility, and how to identify the driver's responsibility have become difficult problems in the process of responsibility identification. To solve the above issues, this paper conducts a comparative analysis of US and UK autonomous vehicle regulations, incorporating China's existing traffic laws, to propose a classification standard for autonomous vehicle traffic accident liability in the Chinese context. This research proposed framework hinges on two principles. Firstly, it differentiates between driving assistance and full autonomous driving, applying existing traffic accident tort liability rules during driving assistance, with manufacturer liability for technology failures. In contrast, autonomous driving warrants manufacturer product liability. Secondly, framework distinguishes between human and autonomous driving, determining liability based on the vehicle's operating mode at the time of an accident. Users are liable if they didn't engage autonomous mode or intervened, while accidents in full autonomous mode invoke manufacturer product liability. Recognizing flaws in the product liability system, such as delayed compensation and high litigation costs, we propose introducing a liability insurance system. This multifaceted approach safeguards victims and mitigates risks in the evolving autonomous driving landscape.

Keywords: autonomous driving vehicle, liability, necessary vigilance, insurance

1. Introduction

1.1. Background

Since there is no unified definition for autonomous driving cars, the regulations issued by the Chinese government, the Beijing municipal government, and SAE (Society of Automotive Engineers) can be used as reference for discussion.

According to the Guiding Opinions of Beijing on Accelerating the Promotion of Road Testing for Autonomous Driving Vehicles [1] released by the Beijing municipal government in 2017, the autonomous driving function refers to:

The function of guiding and making decisions on vehicle driving tasks without the need to test the driver's physical driving operations, and replacing the test driver's control behavior to ensure safe driving of the vehicle.

The Management Specification for Road Testing of Intelligent Connected Vehicles jointly issued by the Ministry of Industry and Information Technology, the Ministry of Public Security, and the Ministry of Transport classifies autonomous driving vehicle into three categories: conditional autonomous driving, highly autonomous driving and fully autonomous driving [2].

Similarly, the SAE divides autonomous driving technology into six levels from no driving automation (Level 0) to full driving automation (Level 5). Based on SAE's standard, when the car is at levels 0 to 2, the driver needs to complete all or part of the driving task and be ready to take over driving at any time. When the car is at levels 3 to 5, the driving system completes all driving tasks.

1.2. Existing Systems of Responsibility Division for Traffic Accidents and Issues

The division of responsibility for traffic accidents that occur when the car is on autopilot has become a difficult issue. After automated driving replaces manual driving, the current traffic accident tort liability system centered on the driving behavior of human drivers is difficult to continue to apply, and there is a need to update the liability rules. With regard to the responsibility for traffic accidents involving self-driving cars, the state of the car at the time of the accident (whether or not it was in self-driving mode), the state of the driver (whether or not there was the necessary vigilance), and the quality of the car's products (whether or not there were any obvious defects) should be adequately analyzed in order to determine the attribution of responsibility. At the same time, in order to provide timely and efficient relief to victims, the role of the liability insurance system should also be fully utilized. At present, there is no common standard to divide the responsibility of autonomous driving vehicle traffic accidents. Although Chinese government agencies as well as the SAE have introduced their own standards for autonomous driving vehicles, they have not set standards for the division of liability for autonomous driving vehicles' accidents. The current system is a human driver-centered system that does not take into account autonomous driving vehicles' accidents. There is no specific law or regulation to stipulate the criteria to determining liability for traffic accidents involving autonomous driving vehicles.

Therefore, this paper will try to put forward a set of reasonable responsibility division standards for autonomous vehicle traffic accidents by analyzing different traffic accidents, in order to help the legislation against autonomous vehicle traffic accidents. In conjunction with the above categorization for self-driving cars, this paper argues that the causal relationship between the human driver's behavior and the accident at the time of the traffic accident varies depending on the human driver's level of involvement in the self-driving car. This paper will explore the identification standard of traffic accident liability for autonomous vehicle suitable for Chinese society by comparing the legal provisions of the British AEV Act and some American states' regulation on traffic accident liability for autonomous vehicle, and combining the current traffic law of China.

2. Current Responsibility Division Systems for Autonomous Driving Vehicle Traffic Accidents

2.1. Automated and Electric Vehicles Act in the U.K.

Britain's AEV Act [3] has divided the responsibility of auto driving accidents, a reference for my research on artificial intelligence and human responsibility in intelligence creation.

Under the AEV Act, the Secretary of State is responsible for maintaining an updated list of motor vehicles that are deemed capable of safely driving themselves in certain circumstances or situations

in Great Britain. These vehicles must also be legally authorized to operate without human control in specific circumstances or situations [3].

According to the interpretation of the AEV Act, the so-called “Driving-Itself” refers to the operation of automated driving vehicle without human control and without human monitoring.

Based on the second provision of the bill, if an automated driving vehicle has an accident under the condition of “Driving-Themselves,” the insurer and the owner of the vehicle shall first be liable for damages caused by the accident depending on whether the vehicle is insured [4]. Specifically, when an accident occurs in Great Britain involving an automated vehicle driving itself on a road or public place, and the vehicle is insured at the time, the insurer is responsible for any resulting damage suffered by an insured person or any other individual [3]. However, if an accident is caused by an automated vehicle operating itself on a road or public place in Great Britain, and at the time of the accident, the vehicle is not insured and exempt from the requirement stated in section 143 of the Road Traffic Act 1988. Due to its status as a public entity or being in the service of the Crown, the onus of responsibility for any consequent damage incurred by an individual involved in the accident falls upon the vehicle’s owner. [3].

Article 3 of the Automated and Electric Vehicles Act (AEV Act) addresses the issue of contributory negligence in cases of automated driving vehicle accidents. It states that if the insurer or vehicle owner is legally liable for the accident, and the injured party has contributed to the accident or damage to some extent, the liability of the insurer or owner can be reduced or exempted proportionally according to the Law Reform (Contributory Negligence) Act. However, if the accident is solely caused by the negligence of the vehicle controller, who allowed the vehicle to operate autonomously under inappropriate circumstances, the insurance company or vehicle owner will not be held liable to the vehicle controller [3].

Article 4 of the Automated and Electric Vehicles Act (AEV Act) outlines conditions under which the liability of the insurer can be limited or exempted. In particular, if the insured or a third party violates the insurance terms by making prohibited changes to the software, or fails to install a safety-critical software update, the insurer’s liability can be affected. The term “safety-critical” refers to software updates that are deemed necessary for the safe use of automated driving vehicles. If the use of such vehicles without installing these updates is deemed unsafe, then the updates are considered safety-critical [3].

In the case of an accident caused by changing the software or not updating the software in violation of the provisions of the insurance terms, if the accident is caused by a person other than the insured, the insurance company may exercise the right of recourse for the amount of compensation paid within the scope specified in the insurance contract after performing the obligation of compensation.

2.2. Regulation of Traffic Accident Liability of Automated Driving Vehicles in the United States

Automated driving is a typical application of artificial intelligence technology. The Federal Automated Vehicles Policy (FAVP) released by the United States in September 2016 formally recognized the qualification of the automated driving vehicle on the road. By the end of 2015, a total of 16 states in the United States introduced legislation on road testing for automated driving, and 16 bills and administrative orders in 9 states came into effect [5]. Specific regulations can be found in Table 1 which is listed below [6]:

Table 1: American autonomous vehicle regulations.

Provisions	State	Bill
Allow intrastate testing, set access conditions, and establish certification procedures for autonomous vehicles.	California	CA SB 1298(2012)
	Florida	FL HB 1207(2012)
		FL HB 599(2012)
		FL HB 7027(2016)
		FL HB 7061(2016)
	Nevada	NV AB 511
		NB SB 140
Exemption of vehicle original manufacturer	Tennessee	TN SB 598(2015)
		TN SB 2333(2016)
		TN SB 1561(2016)
	Washington	2012 DC B 19-0931
	Michigan	MI S 169(2013)
Strengthen research on automated driving		MI SB 663(2013)
	North Dakota	ND HB 1065(2015)
	Utah	UT HB 280(2016)

The American government also set foot in the legal or administrative regulation of the field of automated driving earlier. Particular attention has been paid to the civil liability arising from accidents caused by the accidents of automated driving, which can be summarized as follows:

First, it establishes the principle of liability after the infringement of artificial intelligence products. The state of Michigan and Florida clarify the responsibilities between the original vehicle manufacturer and the automated driving technology provider [5]. Once the vehicle is transformed by a third party to an automated driving vehicle, the original producer is no longer responsible for the vehicle defects unless there is evidence to prove that the vehicle is defective before the transformation [5]. The legislation of the United States only confirms the responsibilities of producers, reformer and users and fails to consider the problem of automated driving vehicle as the subject of independent tort liability. However, this does not mean that there is a lack of need to “punish” the rogue automated driving vehicle. For example, the document issued by the National Highway Traffic Safety Administration (NHTSA) stipulates that once the automated driving system leads the vehicle under the danger of losing control, the vehicle will be recalled and dealt with [7].

Second, it emphasizes the adjustment function of the safety technical specification of the automated driving system and relies on legal or administrative regulations to regulate the design and application of the automated driving vehicle. In Michigan and Florida, new bills were passed in April 2016 and September respectively, which removed the requirement of drivers in the automated driving vehicle and increased the requirement that technicians be able to take over and control vehicles quickly when necessary, or to ensure that vehicles themselves must be able to decelerate or stop [5][8]. If the producer or designer violates the above requirements, they will bear the corresponding product quality responsibility.

3. Application of Different Approaches to Automated Driving Vehicles

3.1. Responsibility Determination of Autonomous Vehicle Accidents under AEV Act

Regardless of the legal differences between states in the United States and countries in the European Union, if an autonomous vehicle accident happened in the United States, since drivers are not required

in an autonomous vehicle in some states [5], it is possible that the driver will not be responsible for the accident unless the driver caused a car accident on purpose.

The next thing is to confirm whether the autonomous vehicle is modified by a third party, outside of the vehicle's central engineers. The original manufacturer will not be responsible for the accident unless there is a design defect. Basically, the designer of automatic system will be responsible for the accident because they have the obligation to make the autonomous vehicle stop when necessary.

In contrast, drivers are required in the EU, which means that drivers are responsible for the accident to some degree, because the drivers are obliged to avoid accidents. Also, designers will be responsible if there was a design defect in the manual intervention system. The autonomous vehicle will also be responsible if the vehicle causes the accident since it is an electric person.

The AEV Act of the United Kingdom clearly defines the responsibility of accidents caused by automated driving vehicles, including the undertaking of insurance liabilities.

Firstly, for the traffic accidents caused by an automated driving vehicle, depending on whether the vehicle is insured or not, the insurer and the owner of the vehicle shall bear the liability for damages. The conditions for the above main body to assume responsibility are that the vehicle operates under the mode of "Driving-Themselves," and some people suffer losses due to accidents without bearing the fault of the parties as the premise. In other words, the assumption of responsibility is not based on the fault of the vehicle party, a rather strict liability [4]. The insurer or the owner of the vehicle can be exempted only if it is clearly stipulated by law. It should be noted that the insurer or vehicle owner has the right to recover from the person directly responsible on the premise of assuming responsibility.

Secondly, in the "Driving-Themselves" mode, individuals who incur losses as a result of a vehicle's own failure have the option to file a direct claim with the insurance company, rather than pursuing the vehicle manufacturer under product liability. This approach undeniably lowers the compensation burden for the victims.

Thirdly, the AEV Act also extends coverage to drivers who experience harm in accidents involving automated driving vehicles. The act encompasses damages suffered by anyone involved in such accidents, including the "driver." This means that damages suffered by the "driver" are included in the compensation framework. In the "Driving-Themselves" mode, the driver's role transforms from being an active driver to a passenger. Therefore, if the driver suffers damage in the "Driving-Themselves" mode, he can claim directly from the insurance company.

3.2. Responsibility Determination of Autonomous Vehicle Accidents under China's Road Traffic Safety Law

China's Road Traffic and Safety Law divides the liability for motor vehicle traffic accidents into two categories:

First is the "liability for accidents between motor vehicles," and the other is the "liability for accidents between motor vehicles, non-motor vehicles and pedestrians [9]." The former adopts the "principle of fault liability," while the latter adopts the "principle of strict liability plus fault offset [10]." In the case of no-fault liability, it is unnecessary to consider the driver's fault in the determination of motor vehicle traffic accident liability [10]. Even if the driver who starts the automated driving system has no fault in taking over the vehicle, the driver should still be responsible for the road traffic accident (between non-motorized vehicles and pedestrians) [11].

Article 49 of the China Tort Liability Law addresses the separation of motor vehicle owners and drivers. In cases where the owner and user of a motor vehicle are different individuals due to leasing, borrowing, or other circumstances, the liability for a traffic accident falls on either party. The insurance company is responsible for compensating within the limits of the compulsory motor vehicle insurance. If the compensation exceeds the insurance coverage, the user of the motor vehicle bears

the responsibility for the additional liability. Nonetheless, if it is determined that the owner of the motor vehicle is responsible for the damage caused, they are accountable for the corresponding compensation. Consequently, in addition to the liability limit of compulsory traffic insurance, motor vehicle owners in China only bear the liability when at fault.

In China, attributing legal responsibilities to automated driving vehicles themselves is currently unrealistic, as they are not considered effective legal entities. Therefore, the onus of responsibility falls on the manufacturer of these automated driving vehicles in accordance with the China Product Quality Law. Specifically, if a defect in the product leads to harm to others, the injured party has the right to seek compensation from the product's manufacturer. Generally speaking, product liability belongs to strict liability without fault. As long as the product has defects, the producer should bear tort liability without proving its fault. Before the law endows automated driving vehicles with legal personality, the legal status of automated driving vehicle is still the product, and applies the product liability law, as long as the injured person can prove that the product is a defective liability.

4. Discussion of Different Approaches

According to the provisions of the AEV Act, the division of responsibility between autonomous vehicles and humans varies depending on the degree of application of autonomous vehicles. In other words, for human drivers, the lower their participation in driving, the less responsibility they bear in case of accidents. Conversely, the higher the level of autonomous vehicles in an accident, the greater the responsibility borne by the autonomous vehicles.

Specifically, drivers are responsible for driving the car before autonomous mode is enabled and after the system is decoupled. During this time, the car operates basically according to traditional driving patterns. Therefore, any traffic accidents that occur during this mode are subject to traditional traffic regulations for cars, and the driver is responsible for any accidents that occur.

In the case of a traffic accident occurring before the driver takes over driving after the autonomous system is started, the responsibility for the accident must be considered. Since the autonomous system operates independently without reminding the driver to take over, the accident may have been caused by system defects or improper system operation. In this case, it seems unfair to attribute the responsibility solely to the driver because the autonomous vehicle does not have the legal status of a legal subject. Instead, it is more reasonable to apply the concept of negating the personality of the system and attribute the responsibility to the producer or designer of the autonomous system. Additionally, if it is impossible to determine the clear responsible party, product liability can be applied. If a traffic accident is indeed caused by a defect in the autonomous system itself, product liability is applicable because the responsible party can be held liable for the defect.

However, according to the content of the Chinese Road Traffic Safety Law, if the owner and user of a motor vehicle are not the same person, the responsibility for traffic accidents should be borne by the user. However, if the user does not have insurance, the owner may need to bear corresponding compensation responsibility. This may bring excessive liability pressure to the owner, especially in the absence of fault.

Indeed, as stated above, the legal status of autonomous vehicles has not been clearly defined in China. However, as an emerging mode of transportation, autonomous vehicles raise legal liability issues that may require further exploration and discussion to inform future legal frameworks.

5. Conclusion

In conclusion, this article proposes that the liability for traffic accidents involving autonomous vehicles can be governed by the following principles: First, differentiate between driving assistance and autonomous driving. As mentioned earlier, driving assistance and autonomous driving are

different concepts. In the stage of driving assistance, the system does not actually bear the driving task, and the user is the real driver, controlling the operation of the vehicle throughout, and the current traffic accident tort liability rules can be applied to accidents that occur during this time. Of course, if the accident is caused by a failure of the assistive technology itself and cannot be corrected by the user, the manufacturer must bear product liability for this. In the autonomous driving stage, as the system substantially undertakes the driving task, the user does not need to perform any driving behavior, so the current traffic accident tort liability rules cannot be continuously applied, and the manufacturer should bear product liability. Second, differentiate between human driving and autonomous driving. Autonomous vehicles do not preclude human driving, so it is necessary to determine whether the vehicle is in manual driving mode or autonomous driving mode when an accident occurs. If the user did not enable autonomous driving mode or actively took over control of the vehicle after enabling autonomous driving mode, then the vehicle operation is still controlled by the user, and the user should bear the traffic accident tort liability for any accidents that occur during this time. Conversely, if the traffic accident occurs when the vehicle is in autonomous driving mode and the system controls the operation of the vehicle, it belongs to product defect tort, and the manufacturer should bear product liability.

Although the product liability system is highly adaptable to new technologies such as autonomous driving, it also has many shortcomings, such as delayed compensation for victims and high litigation costs. Therefore, it is necessary to introduce a liability insurance system to provide timely and effective relief for victims and reduce accident risks. For example, states such as Florida, California, and Washington, D.C. require manufacturers to provide a certain amount of insurance. When an autonomous vehicle is involved in a traffic accident, the liability insurance system should take the lead in providing relief for victims, and only if the system cannot fully cover the damage should the product liability system be invoked.

Furthermore, as autonomous vehicle technology continues to evolve, it's essential to investigate the adaptability of liability frameworks to different levels of autonomy and emerging technologies. This includes considering the implications of advanced artificial intelligence, machine learning, and sensor technologies in shaping liability policies. The ongoing research should also examine international perspectives on autonomous vehicle liability, as different regions may adopt varying approaches.

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