

## “Who Holds the Keys?” Determining the Responsibility in Accidental cases of Automated Vehicles

by

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### *Overview:*

The advent of Industry 4.0 in the late 20th and early 21st centuries has led to the significant integration of digital technologies and automation in the automobile industry. One of the most notable revolutions in this sector has been the development of Automated Vehicles (AVs). These self-driving vehicles can operate without a driver or assist a driver in various tasks. According to the SAE J3016 standard established by SAE International, there are five levels of autonomous driving:

- Level 0: No automation; the driver has complete control of the vehicle.
- Level 1: Features a single automated system (e.g., cruise control).
- Level 2: Partial automation, with the vehicle controlling steering and acceleration but requiring driver oversight.
- Level 3: Conditional automation, where the vehicle manages most driving tasks, but human intervention is required when needed.
- Level 4: High automation, with the vehicle performing all driving functions under specific conditions without human intervention.
- Level 5: Full automation, where the vehicle handles all driving functions under all conditions.

This classification underscores the progressive nature of AV technology and its transformative impact on the automobile industry.

### *Liabilities:*

As AVs become increasingly prevalent on the road, determining liability and accountability in accident cases involving these vehicles is significantly challenging. AVs operate on a complex network of software, hardware, sensors, and infrastructure, making it difficult to pinpoint responsibility. Potential accountable parties include vehicle manufacturers, who can be held liable for design flaws, manufacturing defects, and failure to provide adequate instructions. Software developers might be responsible for coding errors, bugs, and insufficient testing, as well as inadequate software updates and maintenance. Sensor manufacturers can be liable for defects in sensors or hardware components and inaccurate data collection. System integrators might face liability for integration issues and compatibility problems between hardware and software.

Maintenance providers could be liable for improper repairs and the use of non-standard parts. AV owners or remote operators can be held accountable for negligence in vehicle maintenance, failure to follow guidelines, and errors in remote control or monitoring. Infrastructure providers might be liable for poor road conditions, unclear signage, and lack of support for AV technology. Regulatory bodies can face liability for outdated regulations and failure to enforce safety standards. Additionally, cyber-attacks pose a significant threat, as hackers can tamper with AV systems. In such cases, detected attackers should be held solely liable for the

damage caused. Determining liability in AV accidents involves navigating a complex web of potential issues and parties, each with its challenges in proving fault and responsibility.

### ***Challenges:***

AV technology is rapidly evolving, progressively reshaping the traditional regulatory structure of motor vehicles. This evolution presents significant challenges to the conventional regulatory system in managing the accountability of AVs. During accident investigations, stakeholders may blame each other for liability due to the multifaceted nature of AV technology. This makes it difficult for regulatory authorities to determine responsibility, leading to joint and several liabilities in automated vehicle cases.

The intricate and complex nature of AV technology is a primary challenge in assigning liability for damages. It is difficult for regulatory authorities to identify the exact cause of an accident. The sophisticated and composite technology of AVs obstructs the identification of the liable party, complicating the determination of liability. Multiple stakeholders, creating a web of accusations and defenses, will further confuse authorities in assigning responsibility for the damage caused.

Insurance companies will face significant challenges in measuring liabilities for AV incidents, as no straightforward rules can determine liability aspects. The continuous development of AV technology introduces new risks, making it impossible to conduct comprehensive risk assessments. Liability coverage disputes will be an ongoing issue in AV incidents. Insurance companies must develop a framework that integrates both human and machine factors in AV accident claims.

### ***Concluding Remarks:***

The complexity of technology and the involvement of numerous stakeholders make the liability for AV accidents a joint and several responsibility. As this revolutionary technology advances, it is crucial to apply systems thinking to develop comprehensive regulatory frameworks that cover every possible aspect of AVs. Automobile manufacturers like Mahindra, MG, and Kia are already delivering cars with Level 2 autonomy to the Indian market, and some brands have introduced Level 3 autonomous vehicles on Indian roads. This creates an urgent need for the National Road Safety Council to formulate appropriate regulatory measures defining roles, responsibilities, and safety standards. The UK has enacted the Automated Vehicles Act 2024, and Germany introduced its AV Regulation Act in 2017, which now governs Level 4 autonomous vehicles. India must also implement its own AV regulation act to clearly define liabilities and accountabilities.

Ethical considerations must be a critical factor in evaluating the liability for AV accidents, alongside legal and regulatory issues. Algorithmic bias must be eliminated from the AV's processing software, and a dedicated ethical monitoring department should be established by regulatory authorities to oversee ethical concerns in regulatory measures. AV decision-making processes should be transparent and capable of handling a wide range of scenarios. For example, in unavoidable accident situations, how will an AV prioritize safety? Will it favor passengers or pedestrians? These ethical dilemmas complicate determining liability in AV incidents, as they are intertwined with complex moral principles and societal values. By addressing these comprehensive challenges thoughtfully, society can benefit from AV technology while ensuring accountability and safety for all.

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