Overview of Regulations for Autonomous Vehicles

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The legal framework affecting autonomous driving can be divided into:

1. The Vienna Convention
2. Legal Requirements
3. Liability
4. National Rules and Regulations
1. The Vienna Convention

Article 8, ‘Drivers’, paragraph 5 states: ‘Every driver shall at all times be able to control his vehicle or to guide his animals.’

Article 13, (Speed and distance between vehicles), paragraph 8 states: ‘Every driver of a vehicle shall at all times have his vehicle under control so as to be able to exercise due and proper care and to be at all times be in a position to perform all the maneuvers required of him.’

The interpretation of this varies between different countries:

1. Driver capable of being in control.
2. Driver must be in control at all times.
1. The Vienna Convention

- For the countries that interpret the VC as the ‘Driver must always be in control’:
  - Amendments **are needed** in order to make highly and fully automated systems legal.
  - Applies to Germany, France, Italy, and other countries

- For the countries that interpret the VC as the ‘Driver must be capable of being in control’:
  - **No amendments** or changes are needed.
  - Applies to Sweden

- UK has not ratified the Vienna Convention.

*Activities are ongoing to update the VC but may take time.*
2. Legal Requirements Europe

• **Europe**: Present legal requirement with a direct implication on autonomous driving technologies:

  • **UNECE R79** (Steering) (Europe) is in conflict with AD.
    • Must be amended to allow for AD.
    • Working group actively working on proposal for amendments (ACSF: Automated Commanding Steering Functions)
    • The ACSF proposals will not be sufficient for making Europe on par with the US in allowing for AD.
    • Requires driver control and driver activation every 3 min.
    • The driver must be able to gain control within 4s.
    • The car must be able to stay in lane, keep a distance and handle rear impact scenarios on highways.
    • Immediate override required.
    • Present actions will only allow for SAE level 2.5 systems.

• **European requirements may result in obstacles for the AD development!**
2. Legal Requirements US

- *In the US everything specifically not prohibited is legal.*
- The US federal government regulates the equipment and performance of vehicles.
- The states in the US are regulating licensing and usage.
- A few states have adopted regulations for testing of AD.
- NYS requires that the drivers to keep hands on the steering wheel.
- MI have proposed very restrictive regulations for consumer vehicles.
- *Federal guidelines* issued on Sept 19. Proposes both the actions of the federal government and guidelines for the states.
- For states who have nothing prohibiting AD, this is legal today!
2. Legal Requirements US

- The US Federal Automated Policy (issued Sept 19) includes:
  
  - **Vehicle Performance Guidance for Automated Vehicles:**
    - 15 point “Safety Assessment” for the safe design, development, testing and deployment of automated vehicles.
  
  - **Model State Policy:**
    - recommended policy areas for states to consider with a goal of generating a consistent national framework for the testing and deployment of highly automated vehicles.
  
  - **Current Regulatory Tools:**
    - DOT’s current regulatory tools that can be used to accelerate the safe development of HAVs, such as interpretations and exemptions.
  
  - **Modern Regulatory Tools:**
    - potential new regulatory tools and statutory authorities.

- Compliance with the guideline is formally voluntary but in reality mandatory

  *The policy does not restrict the AD development!*
2. Legal Requirements US

• Section I. Vehicle performance:
  • 15-Point Safety Assessment:
    • The manufacturer shall send in a statement addressing the 15 points below.
    • No formal approval process

    • Operational Design Domain: How and where the HAV is supposed to function and operate;
    • Object and Event Detection and Response: Perception and response functionality of the HAV system;
    • Fall Back (Minimal Risk Condition): Response and robustness of the HAV upon system failure;
    • Validation Methods: Testing, validation, and verification of an HAV system;
    • Registration and Certification: Registration and certification to NHTSA of an HAV system;
    • Data Recording and Sharing: HAV system data recording for information sharing, knowledge building and for crash reconstruction purposes;
    • Post-Crash Behavior: Process for how an HAV should perform after a crash and how automation functions can be restored;
    • Privacy: Privacy considerations and protections for users;
    • System Safety: Engineering safety practices to support reasonable system safety;
    • Vehicle Cybersecurity: Approaches to guard against vehicle hacking risks;
    • Human Machine Interface: Approaches for communicating information to the driver, occupant and other road users;
    • Crashworthiness: Protection of occupants in crash situations;
    • Consumer Education and Training: Education and training requirements for users of HAVs;
    • Ethical Considerations: How vehicles are programmed to address conflict dilemmas on the road; and Federal, State and Local Laws:
2. Legal Requirements US

• Section II Model State Policy:

  • Administrative structure and processes that States can set up to administer requirements regarding the use of public roads for HAV testing and deployment in their States;
    • Application by manufacturers or other entities to test HAVs on public roads;
    • Jurisdictional permission to test;
    • Testing by the manufacturer or other entities;
    • Drivers of deployed vehicles;
    • Registration and titling of deployed vehicles;
    • Law enforcement considerations; and
    • Liability and insurance.

  • The federal government is hoping that the states will adopt this policy
  • Will avoid a patchwork of state laws
2. Legal Requirements US

- **Section III Current Regulatory Tools:**
  - Interpretations
  - Exemptions
  - Rulemakings
  - Enforcements

- The federal government will explore how the existing regulatory tools can be applied to the AD development.
2. Legal Requirements US

• Section IV Modern Regulatory Tools:

Considered New Authorities

• NHTSA is looking into new ways to regulate the AD development.

• Safety Assurance: pre-market testing, data and analyses to DOT to demonstrate that organization’s design, manufacturing and testing processes apply NHTSA’s vehicle performance guidance.

• Pre-Market Approval: Pre-market approval authority, in which the government inspects and affirmatively approves new technologies, would be a departure from NHTSA’s current self-certification system. The merits and challenges of implementing some form of a pre-market approval are discussed.

• Cease and Desist: require manufacturers to take immediate action to mitigate safety risks that are so serious and immediate that they constitute “imminent hazards.”

• Expanded Exemptions: Raising the cap on the number of vehicles subject to exemption and/or the length of time of exemptions, to facilitate the safe testing and introduction of HAVs.

• Post-sale Regulation of Software Changes: Regulate post-sale software changes in HAVs.
2. Legal Requirements US

• Section IV Modern Regulatory Tools:

Considered New Tools
• Variable Test Procedures: Expand vehicle testing methods to create test environments more representative of real-world environments.
• Regular Reviews: Regular reviews of standards and testing protocols to keep current with the development of technology.
• Additional Recordkeeping and Reporting: Require additional reporting about HAV testing and deployment.
• Enhanced Data Collection: Enhance data recorders and greater reporting requirements about the performance of HAVs.
2. Legal Requirements China

• AD not legal in China today:
  • This applies both to testing and operation of AD
  • Restrictions for testing is an obstacle in AD development

• Chinese government is looking into how to regulate AD
• AD rules can be adopted rather quickly once the policy decisions have been made.
3. Product Liability/ Criminal Liability

- Product Liability:
  - For SAE levels 4 and 5; if the driver has handed over control to the vehicle. The driver has no responsibility for the driving liability rests with the manufacturer.
  - For SAE level 3 vehicle responsible for monitoring but driver is fallback liability situation is unclear

- Criminal Liability:
  - If vehicle is in control and causing harm:
    - In Europe:
      - Driver may be charged with negligence.
    - In the US:
      - If no speeding or drunk driving no CL charge

*Do drivers have to look under the algorithm hood?*

• Many countries have rules on:
  • Performing secondary tasks while behind the wheel
  • Requirements for hands on the wheel
  • Requirements for the driver to monitor the driver and be in control

• Countries that want to push AD need to remove these usage laws.
Conclusions

• Europe may risk of falling behind the US on AD due to legal hurdles.
• The Vienna Convention and ECE R79 largest obstacles for introducing AD.
• Extensive requirements proposed in the US Federal AD Policy
• Product Liability:
  • Levels 4 and 5: manufacturer liable
  • Level 3: unclear situation
• Criminal Liability:
  • In Europe, driver may be charged with negligence even if the car was in control
• Cybersecurity and privacy may be regulated
• Governments and authorities have a major responsibility for not unduly restricting the possibilities to develop AD technologies.
The Future - Autonomous Driving

Thank You!