

Further promotion of ASV(advanced safety vehicles) in order to advance automated driving

Nana Takahashi ¹⁾ Ayumu Shinohara ¹⁾ Hideki Hayashi ¹⁾ Toru Kojima ²⁾ Nobuhito Kiuchi ¹⁾

*1) Ministry of Land, Infrastructure, Transport and Tourism,
2-1-3 Kasumigaseki, Chiyoda, Tokyo, 100-8918, Japan (E-mail:takahashi-n2am@mlit.go.jp)*

*2) National Traffic Safety and Environment Laboratory,
7-42-27 Higashimachi, Jindaiji, Choufu, Tokyo, 182-0012, Japan*

KEY WORDS: Safety, Combined active and passive safety, Regulation, Advanced Safety Vehicle (C1)

ASV(Advanced Safety Vehicles) are vehicles equipped with systems to contribute to safe driving via advanced technologies. Since 1991, the Ministry of Land, Infrastructure, Transport and Tourism has been aiming to reduce traffic accidents by promoting the development, introduction, and popularization of ASV in the ASV Project, a joint initiative involving industry, academics, and government. In the project, the development and practical application of various ADAS(Advanced Driver-Assistance System), including AEBS(Advanced Emergency Braking System) have been promoted. These achievements have contributed to the promotion of traffic safety, mainly from the elements of vehicle safety technologies.

The ASV Project reviews the targets every five years based on the recent accident statistic analysis and the state-of-the-art technologies development status. In the phase 6 of ASV Project from 2016 to 2020, the following individual issues have been mainly working on under the basic principle of "Promotion of ASV in order to realize automated driving".

- Review the ASV Design Principles with automated driving in mind.
 - Organizing into the way of thinking of ASV technologies, in case that ASV technologies which used to only support the driving a vehicle by human drivers become the main role of driving a vehicle.
- Formulate guidelines on technologies for the realization of automated driving.
 - Evolving emergency driving stop system for taking refuge on shoulder, etc.

In 2021, the number of traffic accidents was 305,196 and the number of fatalities was 2,636, which has been declining in recent years, but many lives are still lost due to traffic accidents and the pace of decrease has slowed in recent years.

In order to further reduce traffic accidents, it is essential to actively develop and popularize ASV technologies. Therefore, we analyzed the current situations and set the main principle and issues to be examined in the phase 7 of ASV project from 2021 to 2025. Table 1 shows the relationship between existing ASV technologies and accidents, and the corresponding countermeasures

Table 1 The relationship between existing ASV technologies and accidents, and the corresponding countermeasures.

Relationship with ASV technologies	Accident cases	Countermeasures
Accidents that can be prevented by existing ASV technologies.	Head-on collision of vehicles.	It is expected that the number of accidents will be further reduced by popularizing the existing ASV technologies. On the other hand, about 100 accidents are reported annually due to overconfidence and misunderstanding of AEBS functions, so it is necessary to take measures to promote correct understanding and utilization of ASV technologies.
Accidents that are difficult to avoid with only existing ASV technologies.	Collision accidents at a blind crossing.	Avoidance of accidents can be expected by utilizing not only information from sensors installed on the vehicle but also information from communication technologies.
	Accidents caused by apparently dangerous driving operations by human drivers.	Avoidance of accidents can be expected by utilizing not only existing ASV technologies that prioritizes driver operations in any case but also technologies that system intervenes in and overrides human driving operations when the danger of driver operation is obvious.
(In a broad sense) Traffic accidents caused by improper human driver operation.	General accidents caused by human error.	Considering that human error caused by drivers accounts for most of the causes of accidents, automated driving is a technology that will contribute to a significant reduction in accidents in the future.

Based on these analyses, we plan to investigate the following four issues under the basic principle of "Further promotion of ASV in order to advance automated driving."

- Promotion of thorough user's proper understanding and utilization of ASV technologies that have become used by everyone.
- Concept of technologies for intervention and override by the system when the danger of human driver operation is obvious.
- Practical application and formulating guideline of technologies utilizing communication and map technologies.
- safety concepts that automated driving vehicles should have in common, considering the fact that there are unavoidable accidents due to the limitations of prediction / detection technologies.