Recommendation

Designing Society by Implementation of Automated Driving for Future Generation Mobility

September 15, 2023

Science Council of Japan

This Recommendation is largely the outcome of the deliberations of the Committee on Designing Society by Implementation of Automated Driving for Future Generation Mobility, the Subcommittee on Automated Driving Planning and the Working Group for the Investigation of Automated Driving and Co-creation for Future Society, Science Council of Japan, and is issued under the auspices of the Science Council of Japan.

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Executive Summary

Ⅰ Background

It is stated that automated driving of automobiles has been shifting from the research and development and demonstration phase to the social implementation phase, due to the 2022 amendment to the Road Traffic Law allowing level 4 as specified automated driving. However, it can be also said that there are many issues that need to be resolved before full-scale deployment. Based on this background, the Science Council of Japan (SCJ) issued the Recommendation "On the Social Issues of Automated Driving - Designing Society through New Mobility" in the year 2020 of its 24th term. Upon implementing the new technology of automated driving in society, the recommendations include the role of automated driving and mobility in the grand design of future society, human-centered design and social implementation with consideration for humanistic and social scientific values and ethics, preparation of verification data and sustainable development based on evidence, and national collaboration between industry, government and academia, human resource development and research and development through national projects in collaboration with industry, government and academia.

The issue-oriented committee of the 25th term of SCJ, the Committee on Designing Society by Implementation of Automated Driving for Future Generation Mobility (hereinafter referred to as 'the Committee'), together with the Subcommittee on Automated Driving Planning and the Working Group for the Investigation of Automated Driving and Co-creation for Future Society, which were established under the Committee, worked to further concretize the recommendations of the previous term and issued the Advisory Opinion 'Ethical, Legal and Social Issues in Automated Driving' in May 2023. Based on this, further discussions have been held to expand the scope of consideration to include the desirable status of mobility in social design, and to examine the creation of mechanisms and human resource development that will benefit society as a whole. We have decided to issue this recommendation as a summary of these activities, describing items that will lead to future action plans and aiming to serve as a reference for the efforts of all stakeholders concerned.

Ⅱ Current Situation and Issues

The implementation of automated driving in society is making steady progress; yet with Level 2, vehicles started full-scale operation in Sakai town, Ibaraki Prefecture, in November 2020, and with Level 3 vehicles started to drive on public roads by the end of FY2020. On the other hand, since the investigation of ELSI (Ethical, Legal and Social Issues) is still far from satisfactory, it is

desirable that the legal system be investigated paying attention to detail by deciding ethical guidelines which are preceding in other countries and the technical guidelines be revised by clarifying safety goals, including dilemma issues (ethical and moral conflicts).

In addition, consideration for the social design is also insufficient on what kind of mobility society will be realized by using automated driving and mobility services. Particularly in Japan, it is essential to envision a society with a drastically shrinking population due to the declining birthrate and aging population, and to create a roadmap for the realization of the goals to be attained. While technological sophistication is also expected, it is necessary to accelerate discussions toward setting appropriate targets that do not obstruct the spread of the technology, as setting excessively high targets will rebound on the cost.

Ⅲ Recommendations

Focusing on ELSI, social design in the era of declining population, and sustainable next-generation mobility, this recommendation lays out the fundamental issues that should be addressed by the cooperative efforts of industry, academia, government, and the private sector, and proposes a roadmap for solving these issues. Regarding ELSI, this summary includes the same content as the "Ethical, Legal, and Social Issues in Automated Driving", the Advisory Opinion issued by the Committee in May 2023.

(1) Ethical Considerations and Legal Issues Study on Automated Driving

It is important to organize ethical issues on fully automated driving for the development of legal systems and social design. It is desirable for the national government, in cooperation with industry, local governments, and citizens, to promote ethical considerations regarding fully automated driving, and to develop optimal "ethical guidelines" at the national level in global contrast, while taking into consideration Japanese culture and regional characteristics.

As the social implementation of fully automated driving without human intervention may be accompanied with various risks and benefits in the long process of deployment, ELSI should be continuously examined by industry, academia, government, and the private sector in response to the needs of the times, along with technical issues such as how human intervention should be and how to design systems to respond to emergency situations.

(2) Grand Design for Society in a Society with a Shrinking Population

Japan's population is declining at a significant rate, and the government should fully discuss and set a direction for sustainable mobility in a society with a shrinking population. The issue of declining population is a major challenge remaining for a certain period of time, and system design requirements compatible with the target regions should be organized and considered for the implementation of next-generation mobility that takes advantage of the demographics and

characteristics of each region.

In such cases, guaranteeing minimum mobility for local residents should be considered, the value and rights of mobility, and the costs and benefits for mobility should also be investigated, and from the perspective of community development, the following benefits should be quantified: health maintenance for the elderly, relief for vulnerable transportation users including those with driving difficulties due to brain diseases, etc., reduction of medical costs, maintenance of social life quality, revitalization of local economy through mobility. The project should visualize the value-enhancing effects on other sectors and indicate a grand design for the entire target area, including the quantification of benefits.

Additionally, from the perspective of the SDGs which aim for a society where no one is left behind, local governments and local residents should work together to develop a cooperative system to introduce, maintain, and manage mobility toward a sustainable society. It is essential to structure an organization that the local governments lead the actions regarding the improvement of mobility and the local residents consider the relevant issues on mobility as their own personal affairs for daily lives.

(3) Clarification of goal setting and collaboration among industry, academia, government, and the private sector for social implementation

It is especially required toward social implementation that fully automated driving systems without human intervention and advanced driver assistance systems incorporating automated driving technology with some human intervention should be positioned as next-generation mobility to solve various social issues, with clear safety goals and specific design targets that are acceptable in terms of cost-benefit effect. For this, it is necessary to make investigation in cooperation with the public and private sectors.

It will take time for fully automated driving to become widespread, and even if it does not reach that point, the benefits of advancing current driver assistance system technologies up to Automated Driving in Level 2 and their social implementation will have a significant benefit, and scenarios for their widespread use also need to be developed under the framework of public-private partnerships. Furthermore, the widespread deployment of this technology should be accelerated by clarifying the specification settings for vehicle manufacturing, with an awareness of business models for mobility and logistics services aiming at fully automated driving. In conjunction with the development of private vehicles, Japan automobile industry should contribute to international cooperation and establishment of international standards and regulations so that it can continue to be a driving force for the Japanese economy.

It is said that our society is in the midst of a once-in-a-century revolution in mobility, and that collaboration between industry, academia, government, and the private sector is extremely important for the social implementation and widespread deployment of new technologies, including response

to carbon neutrality. The government should take the leading role in the activities, the industry should advance technology, and the people should respond to changes according to the requirements of the times, aiming to build a society where the diverse happiness of each individual can be enjoyed.