SIP 2nd Phase : Automated Driving for Universal Services

Final Results Report (2018–2022)

Cross-ministerial Strategic Innovation Promotion Program

Nine Years of Building Up Various Cooperations

As I finish my major role as program director (PD) for the first and second phases of the SIP-adus (Cross-ministerial Strategic Innovation Promotion Program; Automated Driving for Universal Services), I would like to express my sincere gratitude for the support and cooperation of everyone involved over the past nine years.

When I started working on this project nine years ago, I had no experience in automated driving development. I had heard rumors that a project would be launched within the new framework of the SIP, but I thought it was something that I had nothing to do with. It was then that I was assigned to it by the previous Program Director Watanabe, who told me that automated driving is being developed for safety. It was the first time for me to participate in a national project, and I had no idea of which way was up, so I repeated a process of trial and error while asking for everyone's guidance. The SIP is an industry-academia-government collaboration project, and I was able to work with a wide range of people, including experts in academia, government ministries and agencies, and people from industries with which I had no previous relationship. Every day was stimulating and presented an invaluable opportunity to learn much.

Based on the belief that both competition and cooperation are indispensable for the realization of automated driving, I have been planning in the FOTs (Field Operational Tests) in the Tokyo waterfront area and other R&D projects with the participation of a wide range of organizations, including the Japan Automobile Manufacturers Association, universities, venture companies, overseas OEMs, and suppliers, under the concept of "competition and cooperation." It was a great pleasure for me to be able to be a part of the process of industry-academia-government collaboration, inter-industry collaboration, inter-academia collaboration, and international cooperation, where the number of my colleagues increased day by day and I interacted with them in various settings.

We have compiled the results and experiences of the SIP-adus over the past nine years in the "Final Results Report" with the hope that the collaboration will continue to reach new heights even after the completion of the SIP-adus program. We hope that this report will be helpful for your future research and development projects.

SIP-adus Program Director
Seigo Kuzumaki

Toward Solving Social Issues Through Automated Driving, and Achieving a Mobility Society for the Future

The Cross-ministerial Strategic Innovation Promotion Program (SIP) aims to create new value, spur economic growth, and solve social issues by realizing Society 5.0, which is, achieving a high-level fusion of cyberspace and physical space. Led by the Council for Science, Technology and Innovation, it focuses on promoting research and development technologies at a basic research level as well as practical use and commercialization based on the technologies, by involving multiple government agencies and field. The automated driving involves recognizing in cyberspace, massive and diverse data sets (big data) collected from roadside infrastructures and vehicle-mounted sensors, as well as processing the data and making decisions using AI. This data is then used to control and operate vehicles in the real world. Through this process, the program has helped pave the way for Society 5.0. As one of 12 SIP topics, SIP Automated Driving for Universal Services (SIP-adus) has contributed to research and development on common issues (in cooperative areas) concerning automated driving that require collaboration of organizations across government, industry, and academia.

As part of these efforts, the leadership of PD (Program Director) and SPD (Sub Program Director) have spearheaded cooperation among relevant ministries and agencies, industry organizations, and academic institutions, among others, making steady achievements in cooperative areas in which stakeholders across industries and disciplines should engage. These include the distribution of road traffic environment data necessary for automated driving, as well as data usage, safety assurance, and cybersecurity.

In addition, as part of a research and development program aimed at developing practical applications for and commercializing automated driving technologies, I am very pleased with the achievements that the SIP-adus has led to the social implementation of technologies, two major examples being the commercialization of technologies related to the Dynamic Map in the first phase of SIP-adus, and the commercialization of technologies related to a safety assurance platform in virtual environments in the second phase of SIP-adus.

The Sixth Science, Technology, and Innovation Basic Plan (March 2021) articulates the country's intention to solve social problems by effectively utilizing a "convergence of knowledge," which includes both knowledge from the humanities and social sciences. From an early stage, the SIP-adus has seen research done through an approach based on a convergence of knowledge that makes use of knowledge from even the social sciences, which includes analyzing the effectiveness of technologies in reducing traffic fatalities.

Automated driving initiatives that have been ongoing since the first phase of SIP-adus have led to the formulation of a framework for Level 3 automated driving and will conclude in the second phase of SIP-adus after having contributed in many ways to getting this technology onto the international stage, which includes paving the way to the sale of vehicles equipped with Level 3 technology. It is my hope that the achievements of the SIP-adus will be broadly used and help to usher in, as soon as possible, driving support and automated driving technologies that use the road traffic environment data, which has been a central focus of the program.

The Construction of Smart mobility Platform is currently being considered as a topic for the next phase of the SIP. In this context, I hope that the Cabinet Office will work with all stakeholders to develop new approaches to promoting initiatives such as MaaS that will provide people with an integrated combination of different transportation modes, with a view to utilize the achievements of SIP-adus program.

Deputy Director General for Science, Technology and Innovation, Cabinet Office
Takafumi Kakudo

Role as Management Agency and Results

Under the Council for Science, Technology and Innovation, we at NEDO continuously performed three activities as a management agency ((1) Operations management, (2) Creating places for discussions, (3) Information transmission support) from 2017 for the first phase of the SIP-adus (Cross-ministerial Strategic Innovation Promotion Program (SIP) Automated Driving for Universal Services) that began in 2014 and from the start of the second phase of the SIP-adus that began in 2018.

Under the instruction of PD Kuzumaki and along with affiliated government agencies, including the Cabinet Secretariat, experts on various committees, companies, universities, and organizations, we proceeded with 57 initiatives for the social implementation of automated driving, such as international cooperation, shaping public opinion through PR activities, and FOTs (Field Operational Tests) for social implementation, in addition to basic technology development for practical application of automated driving. As we shifted activities to remote formats following the COVID-19 pandemic and the declaration of national emergency, we continued to find a way forward through trial and error. Despite this, we were able to complete the activities for the second phase thanks to the support and passion of everyone related to this project. We would like to take this opportunity to express our gratitude for these efforts.

We have taken efforts for technology development, testing, infrastructure building, and systemization to improve convenience for the realization of automated driving in Japan. In phase two of this project, we engaged in two activities to realize safe and secure automated driving services. One, on the development/testing side, we conducted cybersecurity technology development and built a safety assurance environment (DIVP®) for automated driving in a virtual environment and Dynamic Map, as well as conducted FOTs. Two, in order to realize a rich society through linking surrounding businesses and services centered on automated driving, we established the portal site MD communet® to promote utilization and linkage of geographic data and standardization activities, implemented services in regions, and executed PR and collaboration activities in and outside Japan. These activities produced many results. We are happy to be able to publish these results in the form of the final report.

Aiming for the realization of automated driving technology in Society 5.0 and an automated driving society shown in Public-Private ITS Initiative/Roadmaps, we hope that this final report and the outcomes of the phase two will be fully utilized and lead to the next action for the realization and expansion of safe and secure mobility-related services. We ask for the continued assistance of all persons related to the SIP and those organizations that did not participate.

Executive Director, New Energy and Industrial Technology Development Organization (NEDO)

Tomoyasu Nishimura

For Publication of Final Results Report

Last year, SIP 2nd Phase: Automated Driving for Universal Services—Mid-Term Results Report (2018–2020) summarizing all initiatives in the second phase of SIP-adus (Cross-ministerial Strategic Innovation Promotion Program; Automated Driving for Universal Services) was issued. Thankfully, many people responded to this report positively. We would like to thank the readers.

This final results report summarizes the overall activities of the second phase of SIP-adus, centered on the activities after the publishing of the mid-term results report. While including the opinions of the readers of the mid-term results report as much as possible, we aimed for a report that would be easy to understand and useful.

We hope that this report and the mid-term results report serve as an entrance for all readers, including automated driving researchers in and outside Japan, to deepen their knowledge of the initiatives of the SIP-adus program. Contact information is also available for each article. Please feel free to reach out regarding the use of the research results from the SIP-adus.

Through the support of many affiliated persons and groups, the SIP-adus produced many results in the nine-year period, including the first phase, of this project. We have published this report with the hope that it will lead to research and development and infrastructure building related to automated driving in the future.

December 2022

SIP-adus Final Results Report Editional Committee

Editorial Committee Members

(Affiliation and title is as of October 1, 2022; honorifics omitted)

[Program Director (PD)/Sub-PD]	
Fellow, Advanced R&D and Engineering Company, Toyota Motor Corporation	Seigo Kuzumaki
Visitng Professor, National Graduate Institute for Policy Studies / Principal Fellow, Center for Research and Development Strategy at the Japan Science and Technology Agency	Tateo Arimoto
Executive Chief Engineer, Head of Computer Science Domain, Innovative Research Excellence/Software Defined Mobility Development Supervisory Unit, Business Development Operations, Honda R&D Co., Ltd./ Honda Motor Co., Ltd.	Yoichi Sugimoto
General Manager in Charge, Regulation and Homologation Department, Nissan Motor Co., Ltd.	Haruhiko Kondo
[Experts, etc.]	
President, ITS Japan	Akio Yamamoto
Prime Senior Researcher, Digital Architecture Research Center, National Institute of Advanced Industrial Science and Technology	Shin Kato
Chair, Automated Driving Subcommittee, Safety Technology and Policy Committee, Japan Automobile Manufacturers Association / Executive Chief Engineer, Software Defined Mobility Development Supervisory Unit, Business Development Operations, Honda Motor Co., Ltd.	Kunimichi Hatano
Director General, Institute for ACV standardization / Managing Director for Research Affairs on Automated Driving Technology Director, Automotive Safety Research Department National Traffic Safety and Environment Laboratory, National Agency for Automobile and Land Transport Technology	Terunao Kawai
Researcher, Smart Region Division, Mitsubishi Research Institute	Yurie Toyama
Professor, Graduate School of Media and Governance, Keio University	Manabu Omae
[Secretariat]	
Hiroaki Kimura, Yuichi Araki, Kotaro Sugiyama (Cabinet Office), Takahiro Tanaka, Megumi Funahashi, Shuichi Ajiki, Michihiko Katsuragi (NEDO)	