

Summary of SIP-adus Project (FY2017)

Name of the project

Development of an impact assessment method for Automated Driving System on CO₂ emissions

Responsible Organization

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Object of the Project

Because CO₂ emissions from the transportation sector accounted for approximately 17 percent of total CO₂ emissions in Japan in 2013 and most of the CO₂ emissions is generated from road transport, further reduction of CO₂ emissions from road transport is required. In such a situation, Automated Driving System raise exception for contribution to reduce energy consumption and CO₂ emissions from vehicular highway traffic. This project establishes an evaluation tool which can estimate CO₂ emission reduction effect by Automated Driving System quantitatively to promote popularization of the system.

Project Summary

The target automated driving systems of the evaluation are as follows:

- ✓ Green wave running utilizing traffic signal information
- ✓ Advanced Rapid Transit (a route bus with precision docking and preferential passing)
- ✓ Truck platooning on expressways
- ✓ Automated driving system on expressways and general roads
- ✓ Last-one-mile transport by automated car and Automated valet parking

The following items were conducted in this fiscal year.

I. Development of a traffic simulation model

The developed traffic simulation model to estimate a change of traffic flow by the introduction of the target systems was improved for instance a driving behavior model in a merging section of an expressway.

II. Development of a CO₂ emission model

A CO₂ emission model for a hybrid minivan was developed by conducting a chassis dynamometer test. Furthermore, a model that can estimate energy consumption instead of CO₂ emissions was developed for the evaluation of a zero-emission vehicle.

III. Development of a methodology to evaluate the impact of accident reduction on CO₂ emissions

As the impact of traffic accident on traffic flow, the reduction of travel speed by cause of traffic accident were analyzed using traffic accident data and car probe data and then calculated the traffic capacity drop and its duration by iterative calculation of a macroscopic traffic simulation.

IV. Evaluation in model city

By the calculation of the target systems in model cities, it was confirmed that the developed evaluation tool is applicable to the evaluation of these systems.

V. Promotion and international collaboration in R & D of the evaluation tool for the CO₂ reduction effect

We participated activities of Impact Assessment subgroup in Trilateral Automation in Road Transportation Working. Furthermore, Special Interest Session related to the impact of automated driving systems on traffic flow and CO₂ emissions was organized in ITS World Congress 2017 to exchange views with experts from overseas.

Future plan

- Assessment of the target systems in accordance with demonstration experiments that will be conducted in Japan and investigate best practices to enhance the effect of its introduction using the developed evaluation tool.
- Evaluation of the CO₂ emission reduction effect by the decrease in traffic accidents by the introduction of Automated Driving System.