

Summary of SIP-adus Project (FY2016)

Name of the project	Next-Generation Intelligent Transport Systems (ITS) utilizing Information and Communication Technology (ICT)
Responsible Organization	Ministry of Land, Infrastructure, Transport and Tourism
Name	National Agency for Safety and Land Transport Technology National Traffic Safety and Environment Laboratory, Shibaura Institute of Technology

Object of the Project

This research is intended to clarify the technical requirements of the Automated Driving System which is highly acceptable for many drivers. The system for the research can utilize vehicle to pedestrian (V2P) and vehicle to vehicle (V2V) communication system in order to detect surrounding pedestrians and other vehicles which are not seen by the driver. And also it can reduce the risks of collision by not only supplying information or warning to the driver but also controlling the vehicle speed. The technical requirements are studied through the experimental test result by utilizing the driving simulator.

Project Summary

1) Summary of the experiment

In this research, the Automated Driving System can drive on city roads, and it has a means for switch-on and switch-off by driver's own intention, and also it can be overridden by the driver. The system can detect objects which have collision risks by its sensors. And also, the system can utilize vehicle to pedestrian (V2P) and vehicle to vehicle (V2V) communication system in order to detect the objects which are not seen by the driver. If the system recognizes a risk of collision, it can reduce the risk of collision by not only supplying information or warning to the driver but also controlling vehicle speed. As the means for controlling vehicle speed, the system has the following two functions.

① Speed reduction by gradual deceleration

② Speed reduction and stop of the vehicle by emergency braking for prevention of a imminent collision

As the traffic scenes in the experiment, the following basic concepts a) and b) were considered. And in each traffic scene, an experimental event in which the system reduced a risk of a collision with a pedestrian or other vehicle occurred.

a) Traffic scenes in which normal drivers don't take caution especially to a collision with a pedestrian or other vehicle. (for each one scene of pedestrian and other vehicle)

b) Traffic scenes in which it is considered that normal drivers take more caution to a collision with a pedestrian or other vehicle. (for each one scene of pedestrian and other vehicle)

With regard to supplying information to the driver, two experimental cases were conducted, one was "Not supplying any information to the driver" and the other one was "Supplying information by visual display and sound to the driver".

With regard to experimental participants, seven non-elderly persons and seven elderly persons participated. All participants drive their vehicles in their daily life.

2) Summary of the experimental result

The result of the experiment provided the following items as the draft of technical requirements for the system.

- In such a traffic scene in which normal drivers don't take caution especially to a collision with a pedestrian or other vehicle not seen from the driver, it is considered that the system has to carry out the speed reduction based on more precise judgement of a collision risk.
- In case that the system recognize danger of a collision with a pedestrian or other vehicle not seen from the driver and it executes emergency braking in order to prevent a collision, it is desirable to start emergency braking before the driver visually recognizes the object, and also it is desirable that the driver can recognize that emergency braking is under execution just when he/she visually recognizes the object.
- It is considered that the system has to inform the driver of the action executed by the system. And also, it is desirable to inform the driver of the reason of the action (background).
- In such a traffic scene that even if the system doesn't recognize danger of a collision, the driver may recognize the danger of a collision with an object seen by the driver, it is effective that the system reduce vehicle speed or stop the vehicle.

The draft of a technical guideline was made based on the result of this research and the outcome of both FY2015 and FY2016.

Future plan