Summary of SIP-adus Project (FY2017)

Name of the project	Establishment of technology for providing traffic signal information towards the realization of automated driving
Responsible Organization	UTMS Society of Japan

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Objective of the Project

In order to realize automated driving, it is essential to have a mechanism that allows a vehicle to recognize traffic signal information in real time and perform control; therefore, the project will develop a roadside system that provides traffic signal information to vehicles.

Based on the information of the previous traffic signal via infrared beacon, when drivers arrive at intersection with traffic signal, Traffic Signal Prediction Systems(TSPS) prompts drivers to drive easily and prevents car accidents caused by sudden deceleration and acceleration.
We will study TSPS to realize the high-precision of information provision.
Real time traffic signal information is crucial for the realization of safe automated vehicle operations. Therefore, we will confirm the effectiveness of TSPS and 700MHz band wireless communication through our Field Operational Test(FOT)

Project Summary

We adopted 700MHz band wireless communication to broadcast the latest Signal Phase and Timing (SPaT) as a complementary measure for infrared beacons and planned a field experiment in Aichi Prefecture.

FY 2016: We installed 700MHz band equipment at five crucial intersections in the sub area of Aichi Prefecture model environment.
(infrared beacon and 700MHz band ITS road side unit)
FY 2017: We developed an evaluation system, conducted a filed Operational test(FOT) and collected test data from 500 driving tests for 10 days.

1) The measurement of time difference between 700MHz field devices and traffic signals
Time difference between traffic signals and model system for experiment was up to 99.9ms.

2)The measurement of effective support with 700MHz band
Infrared beacons could provide only about 30% of necessary information on important intersections to the vehicle.
On the other hand, when 700 MHz band radio was additionally used, it was confirmed that 100% of necessary information could be provided.

3)The measurement of fuel consumption and driving time (infrared beacon and 700MHz band radio, infrared beacon, and no system equipment)
We calculated and compared energy efficiency from the result of the field Operational test(FOT) , and we couldn't find useful difference.

4)Histogram of sudden deceleration
Owing to effective coverage of ITS field devices, sudden deceleration decreased and smooth driving increased.
The number of sudden decelerations decreased about 20%.

5)The guideline for installation position of infrared beacon
The installation position of infrared beacon not based on regulation speed but based on current speed or average speed between start point and end point was proposed.

Future plan

We will evaluate the accuracy of traffic signal information, for example the delay or fluctuation of information.
We will research human-machine interface(HMI), connectivity, and cooperation of car company and infrastructure company.
We must establish specifications for roadside equipment.