Objectives and potential applications of VSC  part I

AHS
Road – Vehicle Cooperation

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Contents

1. Background of AHS

2. Overview of 1\textsuperscript{st} stage AHS

3. Direction of 2\textsuperscript{nd} stage AHS
Trend of Traffic Accidents in Japan

Numbers of fatalities

Number of accidents

(unit: thousands)

from Traffic Accident Statistics
Breakdown of Causes in the Driver

Cause of accident in 75% of cases was driver error immediately before accident.
Need for measures immediately before accidents

Classified Traffic Accident Countermeasures with temporal transition

- **Before**
  - Countermeasures Taken in Advance
    - Improving Roadway Itself
    - Installing Road Signs and Lightnings
    - Safety Driving Education

- **Immediately before Accident**
  - Countermeasures Taken Immediately before Accident
    - Areas Where Measures Were Delayed for Technical Reasons

- **During & Immediately after**
  - Countermeasures Taken During Accident and “Immediately after” Accident
    - Mandatory of Seatbelt Use
    - Widespread of Airbag Use
    - Installation of Guardrails

- **After**
  - Countermeasures Taken After Accident
    - Establishing Emergency Call Systems
    - Advanced Emergency Medical Service

Areas of Accident Fatalities Reduction

Areas of Accidents Reduction

Target of AHS services
## Comparison of Features

<table>
<thead>
<tr>
<th>Item</th>
<th>Vehicle Standalone</th>
<th>Vehicle Standalone</th>
<th>Road Infrastructure or Other Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition of information on vehicle vicinity</td>
<td>Strength</td>
<td>Strength</td>
<td>Limitation</td>
</tr>
<tr>
<td>Acquisition of information at distance, on blind spots</td>
<td>Impossible</td>
<td>Impossible</td>
<td>Possible</td>
</tr>
<tr>
<td>Usable locations</td>
<td>All</td>
<td>All</td>
<td>Only where installed</td>
</tr>
<tr>
<td>Flexibility of perspective</td>
<td>Small</td>
<td>Small</td>
<td>Great</td>
</tr>
<tr>
<td>Signal throughput</td>
<td>Short</td>
<td>Short</td>
<td>Long</td>
</tr>
<tr>
<td>Linkage to other information</td>
<td>Difficult</td>
<td>Difficult</td>
<td>Few limitations</td>
</tr>
<tr>
<td>Influence of weather</td>
<td>Affected</td>
<td>Affected</td>
<td>Not affected</td>
</tr>
<tr>
<td>Separate judgment for traffic condition</td>
<td>Strength</td>
<td>Strength</td>
<td>Limitation</td>
</tr>
<tr>
<td>Integrated judgment for traffic condition</td>
<td>Limitation</td>
<td>Limitation</td>
<td>Strength</td>
</tr>
<tr>
<td>Reflexive driving Support</td>
<td>Strength</td>
<td>Strength</td>
<td>Limitation</td>
</tr>
<tr>
<td>Deliberative driving Support</td>
<td>Limitation</td>
<td>Limitation</td>
<td>Strength</td>
</tr>
</tbody>
</table>
Cooperative Driving Support System

Real-time Driving Support by Infrastructure & Vehicle cooperation

Smartcar (ASV)  Smart Gateway  Smartway (AHS)

ASV : Advanced Safety Vehicle  R&D on Intelligent Vehicle
AHS : Advanced cruise-assist Highway System  R&D on Intelligent Road
Basic Concepts of AHS and ASV

Infrastructure detects circumstances at positions that cannot be confirmed from vehicles.

Information detected by infrastructure is transmitted to vehicles via DSRC.

Vehicle side detects portions that can be perceived by drivers and/or vehicles.

Vehicle side takes charge of portions that can be perceived by drivers and/or vehicle sensors.

Infrastructure - Takes charge of the range that is difficult or impossible to perceive by drivers and/or vehicles.
Road Surface Sensor

Making it possible to acquire information on the worst conditions within the area, which is useful for road management.
Road Condition Sensor

Detecting Individual Vehicle Behavior

Image

Position

Speed

Analysis of Phenomena □ Improve Road Facilities
Sangubashi Curve on Metropolitan Expressway

- Sharply curved with a radius of 88m
- In 2002, 140 accidents occurred on this section
- Poor visibility because of buildings alongside the road
Information of VICS
AHS Development Toward 2\textsuperscript{nd} Stage ITS

ITS Enter the Second Stage Smartway was placed as a national strategy aiming to realize a full-fledged ITS society through the concrete objectives of Zero Fatal Traffic Accidents, Safe Driving Support for the Rapidly Growing Number of Elderly Drivers.

- Concept of vehicle-highway cooperation up to now and spread it to the world
- The effort to realize a full-fledged ITS society in 2007 is underway
- Early implementation is the goal for information provision,
Roadmap of Services Targeted

Roadmap for Cooperative vehicle highway systems

- Use and link to overall efforts for gradual practical application, by using results of research and development and technologies.
- To realize a highly sophisticated cooperative vehicle-highway systems as road and vehicle systems undergo their respective advances.
Cooperative Driving Support System

Subject Vehicle

Vehicle Safety Communication

Road Infrastructure

Other Vehicle