AASHTO International Day

SIP Automated Driving System
— Mobility bringing everyone a smile —

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SIP-adus International Cooperative WG

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Intensive R&D program
- promote 5-years R&D (FY2014 - FY2018)
- enhancing cross-ministerial cooperation

11 research themes
From societal issues such as Energy, Next-Generation Infrastructures and Local Resources, including R&D for AD

Leadership
CSTI appointed Program Directors and allocates the budget for each research theme.

“SIP” means Cross-Ministerial Strategic Innovation Promotion Program
“adus” means Automated Driving systems for Universal Services
- Ensuring safety and traffic jam reduction on the road
- Realization and spread of Automated Driving System
- Realization of advanced next generation public bus service for vulnerable people.

Automated Driving: The Evolutionary Framework

Realization of Level 2 on highway by 2020  Prioritization for next step Level 2 on regular road
SIP places emphasis on R&D in cooperative area with industry, academia and government.

Important Technologies
- Self-position estimation
- Neighboring environmental recognition

Basic Tech. Security, Simulation, Database, etc.

Vehicle
- Recognition
- <Recognition>
- Map, ITS info., Sensor
- Judgement
- <Judgement>
- AI
- Operation
- <Operation>
- Actuator

Human Machine Interface
- Cooperation w/Human

Dynamic Map
- ITS Predictive Information
- High Definition 3D Map

Onboard Sensors
- GNSS
- Laser Scanner (LiDAR)
- Camera
- Radar

In red: Area of Cooperation ⇒ Main Area of SIP-adus
Steps to the Goal

- Framework Construction
- Investigation for various R&D theme

- Integration into 5 major R&D theme activity

- Final step to the Goal

- Implementation

- International
- Large-scale FOT
- Wide Area
- Comprehensive
Field Operational Test (FOT)

"Main themes"
- Dynamic map
- HMI
- Cyber security
- Social acceptance
- Pedestrian collision reduction
- Next generation transport

"Objectives"
- Activation of the study / technology development
- An evaluation, a problem is extracted in more viewpoints
- Confirmation of the practical use
- International cooperation and harmonization
- Social acceptability promotion
Participants of FOT

(Each participant brings a vehicle of their own)

Period

Test sites of FOT

Test facility
JARI* Test course; New test facility for AV evaluation

Arterial roads
Tokyo waterfront city area app.25km

Expressway
Utilize the part of the following expressway.
Total : app.300km.

(*JARI : Japan Automotive Research Institute)
Use Dynamic Map as an advanced traffic info. database for all vehicles, not only as a precise map for automated driving vehicle.

- **Dynamic Info. (Changes in short time.)**
  - ITS anticipative Info.
    - (V2V, V2P, traffic signal rotation cycle, etc.)

- **Semi-dynamic Info. (Current phenomenon)**
  - Accident, Congestion, Local weather etc.

- **Semi-static info. (Scheduled phenomenon)**
  - Traffic control plan, Road construction plan,
    - Weather forecast, etc.

- **Static Information**
  - Road shape, Topological data, etc.
Dynamic map is evaluated through 3 steps FOT.

1. To validate 3D high-definition digital map data. (Ongoing)
2. To validate data collection and distribution method. (FY2018)
3. To verify the utility of semi dynamic information. (FY2018)

Map data is provided by SIP-adus. (Express way: 300km, Arterial road: 25km)
Human Machine Interface FOT

SIP-adus is focusing on the three major HMI tasks for AV.

**Task A:** To investigate effects of system information on drivers’ behavior. (FY2018)

**Task B:** To investigate effects of driver state on his/her behavior in transition. (Ongoing)

**Task C:** To investigate effective ways to functionalize AV to be communicative. (FY2018)

FOT @T/C and real traffic environment
For CV and AV, Cyber security becomes the technology to take the high priority.

- Common Architecture Model
- Use Cases of Automated Driving (JAMA)
- Thread Info. (JPCERT/CC, Auto-ISAC)
- Evaluation (Attack) Info. (Auto-ISAC)

Vulnerability Evaluation

- Countermeasure
- Level of Countermeasure

Comparison with Current Threat Analysis (JasPar)

Threat Analysis Tool

Cyber Security Evaluation Guideline

FOT using Evaluation Guideline will start in FY2018
Pedestrian Collision Reduction FOT

- Mitigate pedestrian accidents using V2P communication system.
- Exchange high accuracy positions and situations between pedestrians and vehicles for support recognition.
- Evaluate system performance and effectiveness under real traffic world.

FOT @ Tokyo water front city area will start in FY2018
Next generation urban transportation is realized by the ITS technologies and the automated driving technologies.

Evaluate system performance and effectiveness under real traffic world.

FOT and showcase event are planned in 2018
SIP-adus is working on the realization of Automated Driving System by focusing on R&D in cooperative area.

Large-scale FOT for the final step to the goal has started from Oct. 2017 with various participants.

Detail and updated information of SIP-adus Large-scale FOT is http://www.nedo.go.jp/english/sip_ai2017.html#overview
Thank you for your attention

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