
"Cross-ministerial Strategic Innovation Promotion Program (SIP) –
Automated Driving for Universal Services"
Research on the demonstration experiments of the Advanced Rapid Transit

Summary

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1. Overview

Background

- Automated driving system is being developed in SIP-adus, and the importance of demonstration experiments on public roads is increasing in the future for practical application and dissemination of the results.
- Securing safety is essential in demonstration, but at present it's sometimes difficult to ensure sufficiently with vehicle-only observation information. We need to encourage the practical use of the system by constructing the model environment and promoting the experiment of each company.
- In SIP-adus, Tokyo 2020 Olympics & Paralympics are a milestone. JAMA also announces that they will tackle demonstration of automatic driving towards the event.

Establishment of model environment for demonstration



Technologies through demonstration utilizing model environment



Demonstration at the Tokyo Olympics and the Paralympics in 2020



Practical application and promotion of automatic traveling system

1. Overview

Planning conferences

① Examination of ideal environment for demonstration

Study current technical developments and issues of car manufacturers developing automated vehicles

Organize the expected environment for demonstration experiments on public roads

② Survey on the current situation of roads etc.

Investigate the present condition of the roads and highways in Tokyo and organize them in maps

③ Examination of model environment for demonstration

Demonstrate the model environment, formulate a construction plan and estimate approximate cost

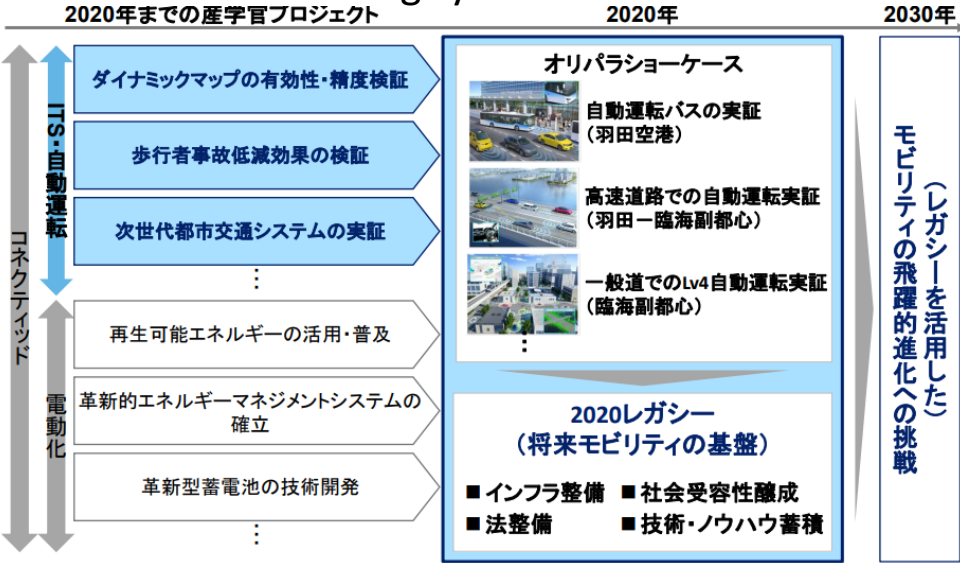
If there is a problem, summarize a task

2. Examination of ideal environment for demonstration

Results of conferences

	date	place
1 st	Dec 13, 2017	JAMA
2 nd	Jan 19, 2018	JAMA
3 rd	Feb 26, 2018	METI
4 th	Mar 22, 2018	JAMA

- At JAMA, announced the plan of showcase between Haneda airport and Tokyo bay area for 2020 Olympics & Paralympics
- The bay area, Haneda airport and the expressway between them were selected as candidates for demonstration area of the automatic driving system



(Source: JAMA)

JAMA mid-long term mobility vision

2. Examination of ideal environment for demonstration

- Organizing the environment expected in experiments on public roads
Organize the expected environment for demonstrations in each selected area, based on the current status and problems of automatic driving technology grasped through conferences and prior studies etc..

Area	Road	Expected environment
Rinkai-Fukutoshin	non-intersection	<ul style="list-style-type: none"> ➤ Road surface display maintenance (high visibility lane markings etc.) ➤ Guard rail (pedestrian separation)
	signalized intersection	<ul style="list-style-type: none"> ➤ Arrow light device (right straight separation by signal, pedestrian separation) ➤ Wireless roadside device (signal information) ➤ Rubber pole (intersection passing support) ➤ Pedestrian detection ➤ Entering vehicle detection ➤ Vehicle information around the intersection (for each lane) ➤ Dedicated, priority lane law amendment (automated driving car dedicated right turn lane)
	all	<ul style="list-style-type: none"> ➤ High precision map ➤ Magnetic marker ➤ Traffic regulation (compliance with the Road Traffic Law, removal of illegally parked vehicles) ➤ Demonstration experiment base (conference room, tent, parking lot etc.)
Highway	non-intersection	<ul style="list-style-type: none"> ➤ Road surface display maintenance (high visibility lane markings etc.)

2. Examination of ideal environment for demonstration

■ Organizing the environment expected in experiments on public roads

Area	Road	Expected environment
Highway	non-intersection	➤ Road surface display maintenance (high visibility lane markings etc.)
	confluence	➤ Assistance for confluence with main line vehicle information etc. by radio roadside device on confluence lane and vehicle detector on main line
	tollgate	➤ Assistance for passing-through with ETC gate information etc. by radio roadside device
	all	➤ High precision map ➤ 5G wireless systems
Haneda Airport	non-intersection	➤ Road surface display maintenance (high visibility lane markings etc.) ➤ Guard rail (pedestrian separation) ➤ Color pavement (bus lane) ➤ Rubber pole (lane boundary)
	signalized intersection	➤ Arrow light device (right straight separation by signal, pedestrian separation) ➤ Wireless roadside device (signal information) ➤ Rubber pole (intersection passing support) ➤ PTPS (priority signal control)
	bus stop	➤ Bus stop maintenance (including accessible environment such as platform for getting on and off)
	all	➤ High precision map ➤ Magnetic marker ➤ Traffic regulation (compliance with the Road Traffic Law, removal of illegally parked vehicles) ➤ Demonstration experiment base (conference room, tent, parking lot etc.)

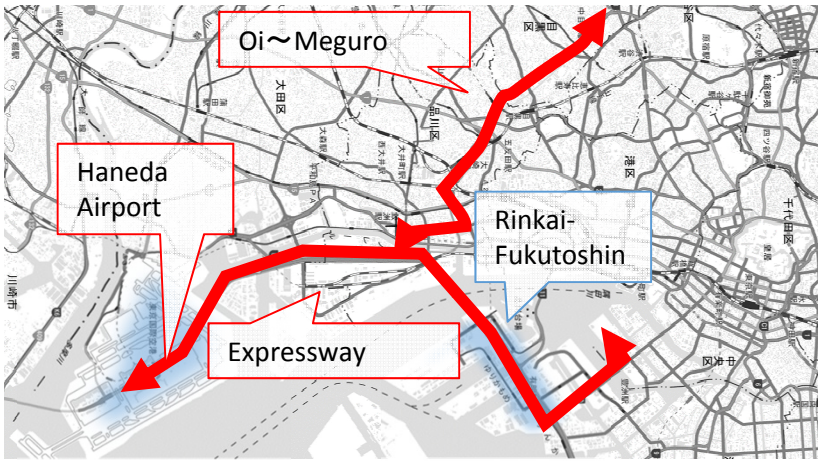
3. Survey on the current situation of roads etc.

■ Survey contents

content	method	data
Lanes, cross sections	Desk research	road traffic census, google map etc.
Presence or absence of a right / left turn lane	Desk research	google map etc.
Position and type of traffic signal (right turn signal · V2I installation status)	Desk research	google map etc. (including data provided by road administrator)
Status of guard rails	Desk/onsite research	google map, on-board camera etc.
Bicycle path status	Desk research	road traffic census, google map etc.
Disappearance of white line	Onsite research	on-board camera

■ Survey area

Chose the area in terms of needs etc.



Points in selecting survey areas

- Each experiment in ① can be conducted
- Includes the roads suitable for showcase
- Includes the common road environment in the whole country
- High feasibility of experiments

3. Survey on the current situation of roads etc.

■ Results

Results were organized mainly for intersections, white lines, and road traffic conditions at each location.

Many places have possibility of confusion with pedestrians and oncoming vehicles.

▼ Results examples

Intersection survey

現状

- 歩行者と錯綜の可能性

課題・整備が必要な事項

- 歩車の分離
- 交差点通過情報の提供が必要

ルート案

白線等状態調査結果：

白線等状態調査結果：		Road lines survey	
区間	位置		
豊洲～有明	16.3	163	
	16.4	164	C
	16.5	165	C
	16.6	166	C
	16.7	167	B
	16.8	168	B

お台場エリア図 A

Road condition survey

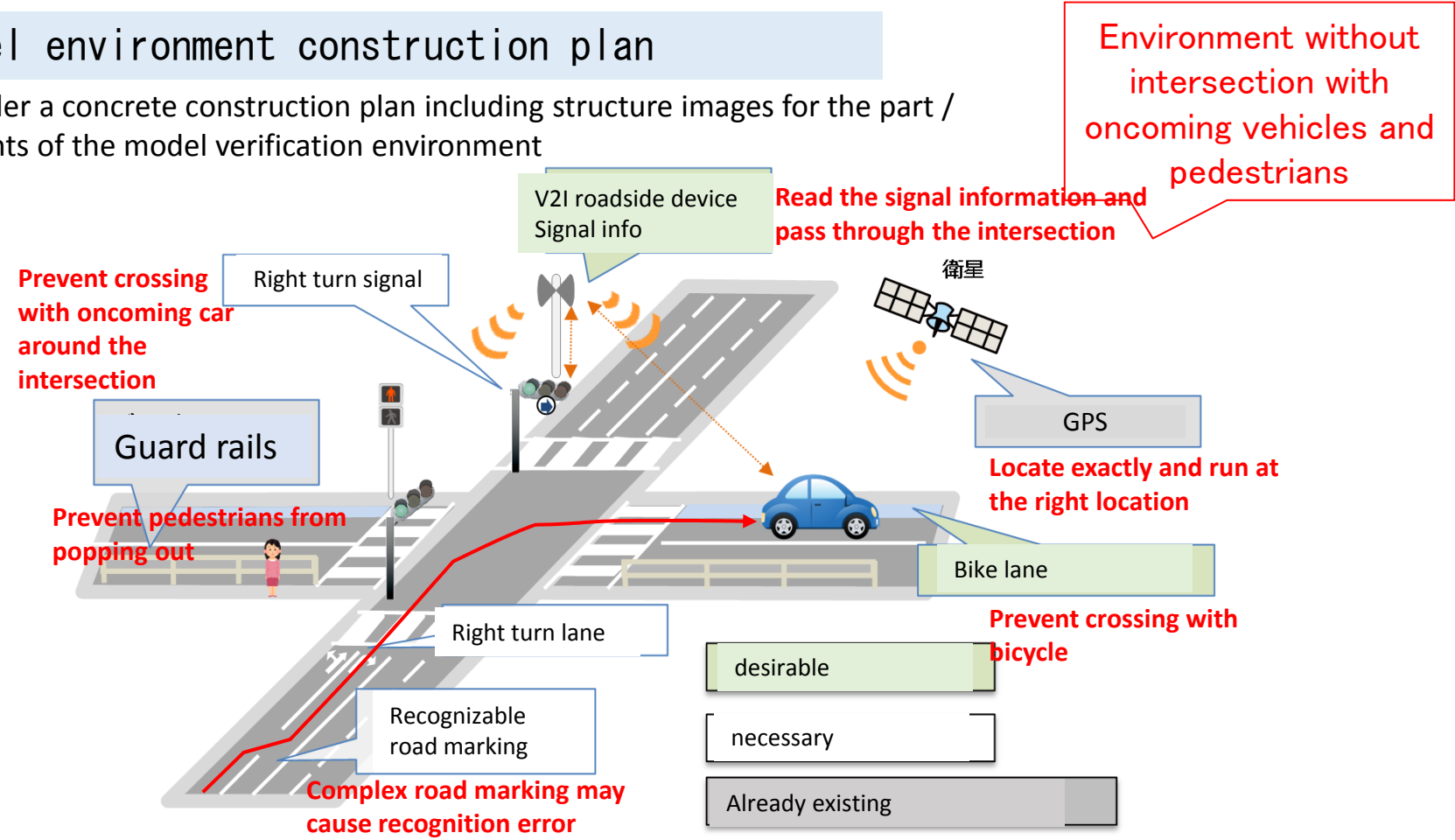
凡例

- ガードレール
- 標識
- 信号機
- バス停
- 情報看板

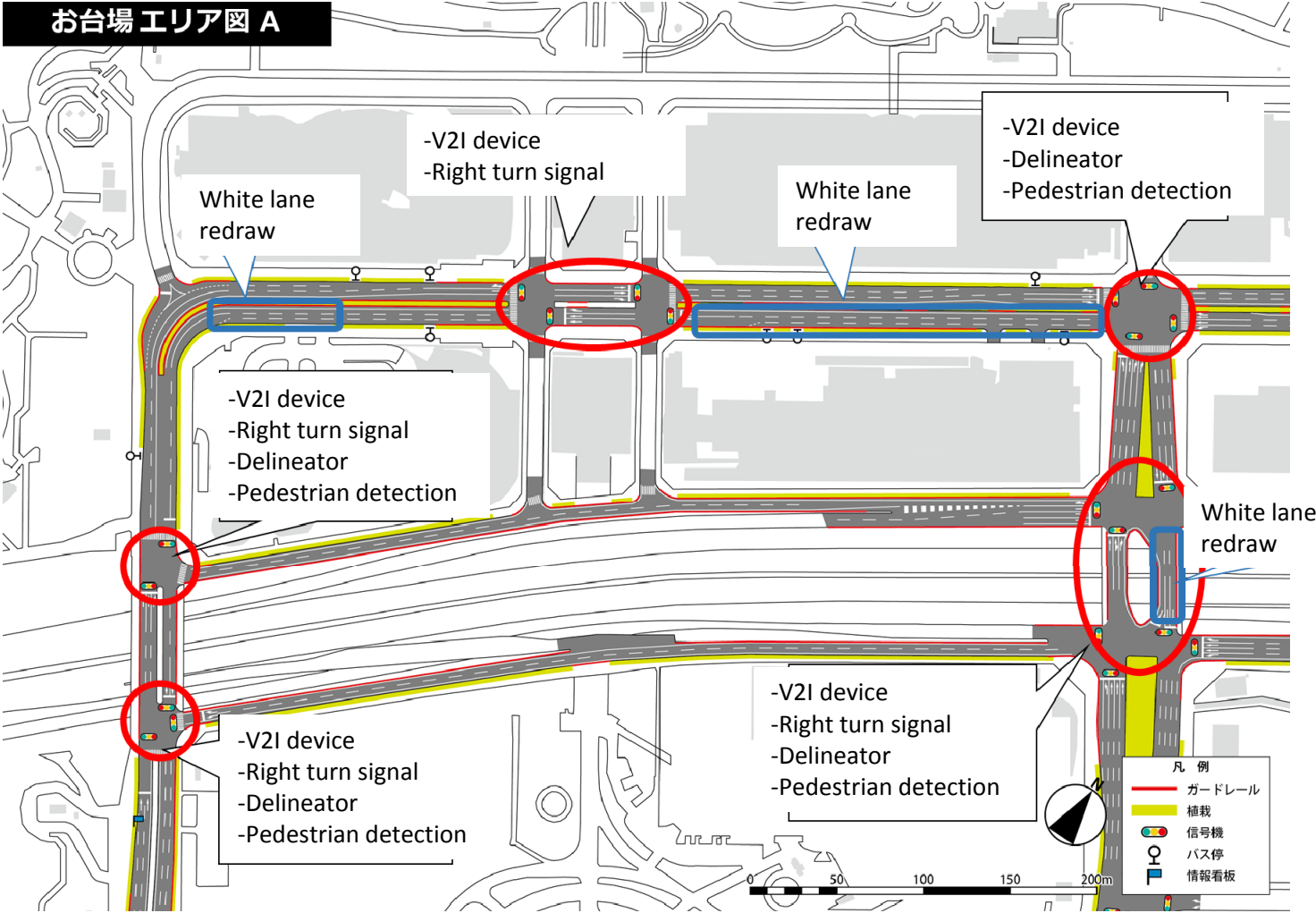
4. Examination of model environment for demonstration

Model environment construction plan

Consider a concrete construction plan including structure images for the part / contents of the model verification environment



4. Examination of model environment for demonstration



4. Examination of model environment for demonstration

■ Estimated cost

item	area		Cost(1,000 yen)	remarks
① infrastructure	Daiba		89,185	White line, Pedestrian separation, Intersection support (landmark) etc.
	Haneda		212,945	Magnetic markers, dedicated bus lanes, bus stops etc.
	Expressway		111,647	Only white line redraw
	total		413,777	
② signals/communication system	Daiba/Haneda (36 spots)	2018	664,200	Installation of ITS roadside equipment, new traffic lights Development design for automatic driving
		2019	224,200	Modification of devices
	total		888,400	
③ signals/communication system	Expressway		676,000	ETC support, confluence support
total			1,978,177	In addition, 74,794,000 yen for Haneda area road restoration