The Society We Want to Realize and the Value We Want to Provide

HONDA

Serve people worldwide with the “joy of expanding their life’s potential”

- Lead the advancement of mobility and enable people everywhere in the world to improve their daily lives -

Environmental technology	Collision-free technology	Honda eMaaS・Connected
Carbon-free society	A society with zero traffic accidents	A society that expands life’s potential
Toward a sustainable eco-society	Giving a sense of security to all traffic participants	Enjoyable, convenient, and comfortable for everyone

Existing value

Human-centered product manufacturing for the users’ benefit

Roadmap of Automated Driving / Driving Support Technologies

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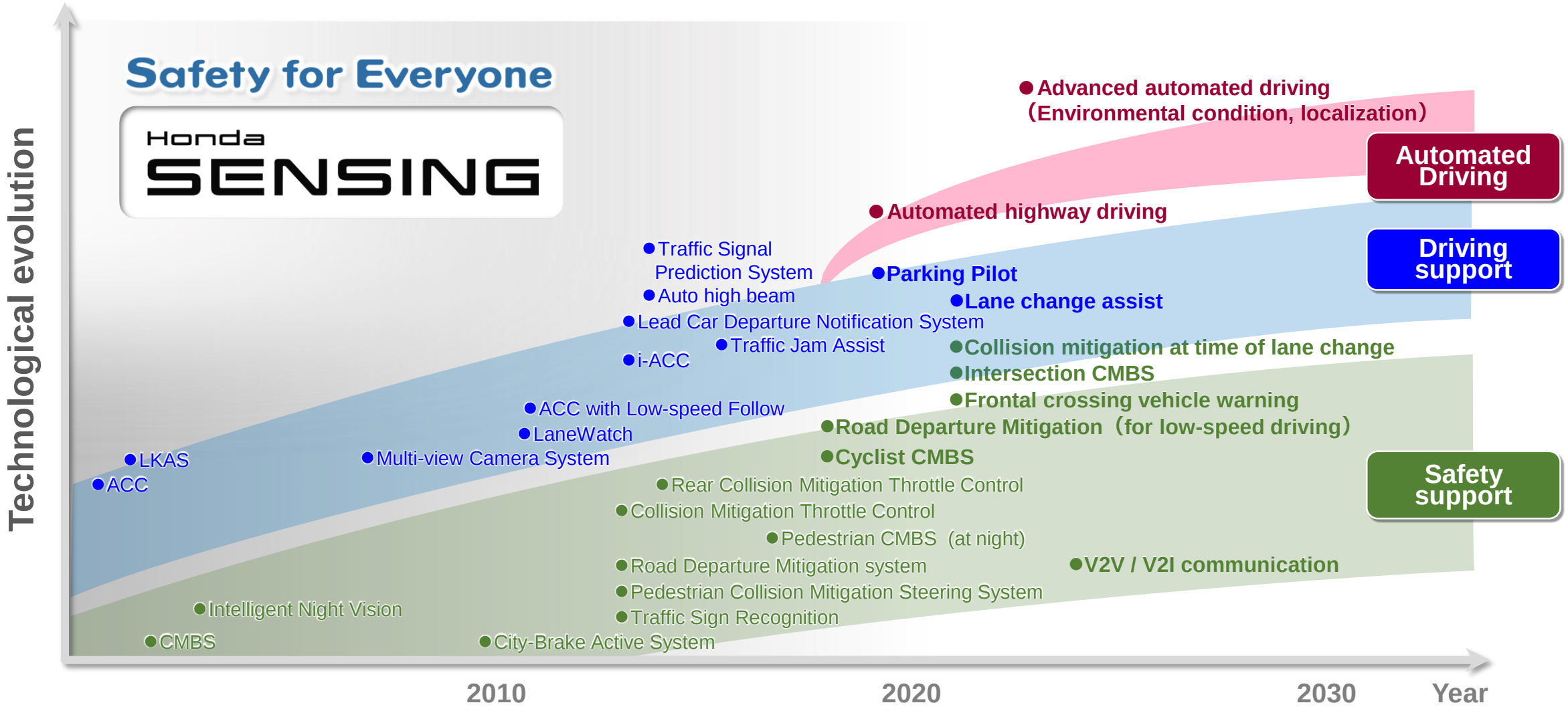
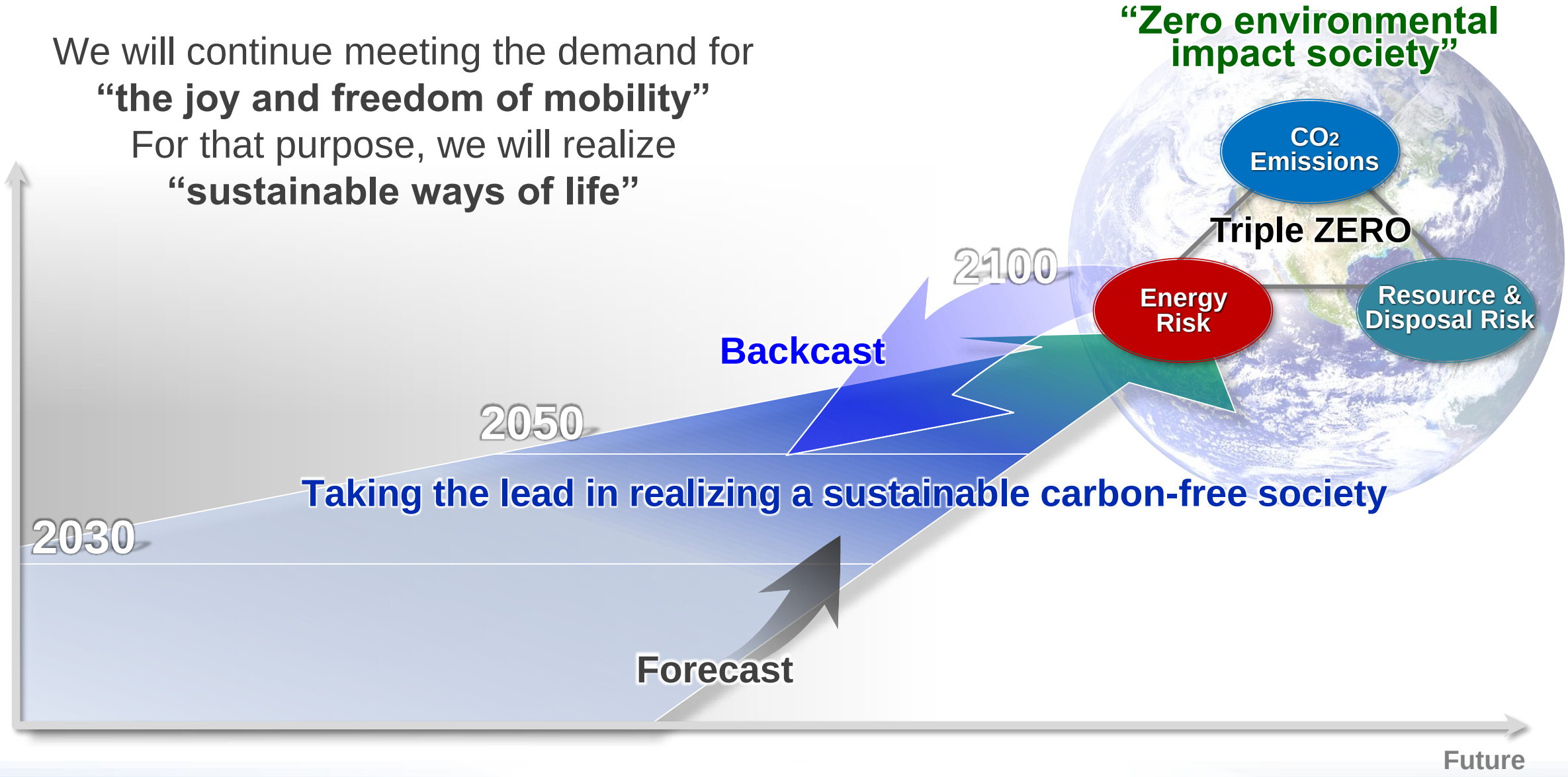
Collision-free Society and Joy & Freedom of Mobility



Honda's Environmental Initiatives

HONDA

We will continue meeting the demand for
"the joy and freedom of mobility"
For that purpose, we will realize
"sustainable ways of life"



Honda eMaaS

HONDA

Honda Mobile Power Pack
(Detachable portable battery)

Honda Mobile Power Pack Charge & Supply Concept
(Portable charger and discharger)

Honda Mobile Power Pack Exchanger
(Charging station unit)

Portable distributed generator

Microgrid

Expansion of use of renewable energy

Smart Hydrogen Station

Stationary distributed generator

EaaS

Use of environmentally friendly smart electricity

Power Exporter 9000
(Portable external power output device for V2L)

Stationary battery storage station

ubitricity SmartCable
ubitricity SimpleSocket
(Smart charging cable)

Honda Power Manager Prototype
(Bidirectional charge and supply device)

Honda eMaaS

BEV

PHEV / FCV

Honda Mobile Power Pack Vehicle with dual power supply system

MaaS

The joy and freedom of mobility

Honda Mobile Power Pack 4W-Vehicle Concept
(Small electric mobility)

Honda P.A.T.H. Bot

3E-B18

3E-C18

ESMO Concept

PCX ELECTRIC
(Electric motorcycle)

The joy of making their lives better

Honda eMaaS is abbreviation of Honda Energy Mobility as a Service

Providing the joy of making their lives better via carbon-free society

Honda ITS global efforts to help people live safe and secure

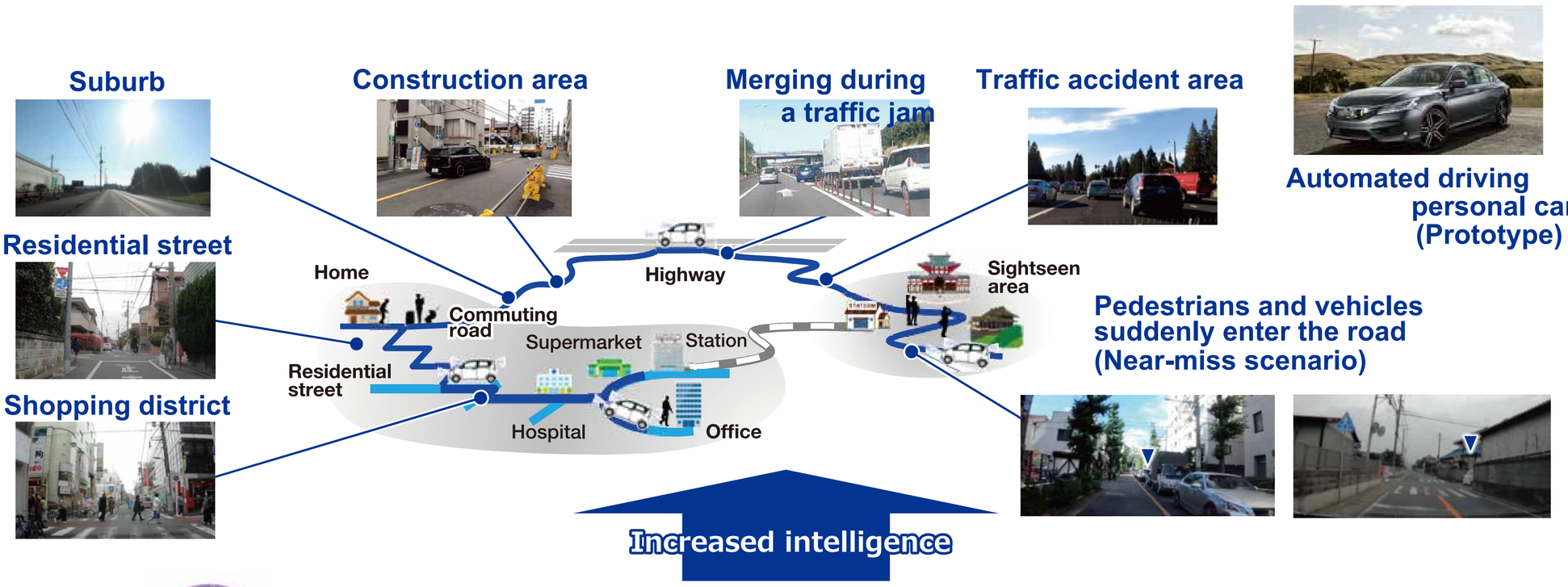
HONDA

Category	Exhibition items	Expansion area ○ <Exhibited this time ●>		
		Asia	Americas	Europe
Collision-free technology Striving toward a Collision-free Mobile Society	・Automated Driving via Anticipation , Prediction and Cooperative driving by AI	●	○	○
	・L3 Pilot Driving Automation European countries Piloting Automated Driving on European Roads	○	○	●
	・Honda SENSING ・Honda SENSING VR	● ●	○	○
	・U.S. Smart Mobility Corridor V2X Pilot Deployment ・Safe Swarm VR		● ●	
Environmental technology Striving toward a Zero-Emission Society	・Data collection scheme and Battery service information in Demonstration Program	●		
Honda eMaaS・Connected Striving toward a Society that expands life's potential	・New utilization of V2X technology～Kakogawa City	●		
	・A demonstration experiment of Road Surface Condition Monitoring system using vehicle probe data in America		●	
	・A demonstration experiment of Anti-steal system for motorcycle, using Terrestrial Digital broadcasting in Brazil		●	

Automated Driving via Anticipation, Prediction and Cooperative driving by AI

Further Evolution of Automated Driving Technologies

Advanced AI technologies are needed to realize safety and secure feeling by means of anticipation and prediction and to cooperate with other traffic participants in complex traffic scenario in order to expand the scope of "freedom of mobility."



AI **Anticipation and prediction to prevent the vehicle approaching a dangerous situation**
Coordinated action that can be mutually understood

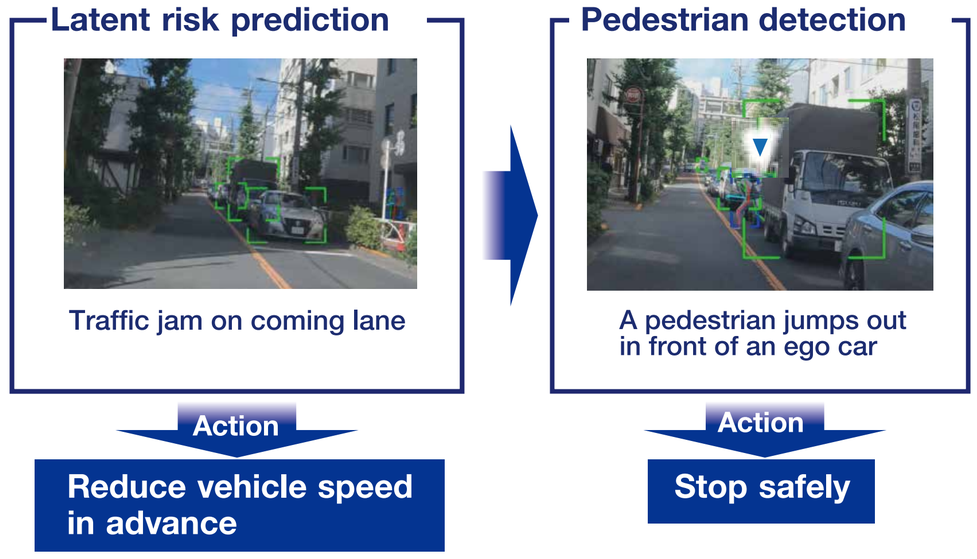
Applied Technology

Preventive safety driving via anticipation and prediction by AI

Reading behaviors of other traffic participants

Prediction of pedestrian behavior from face direction, body direction, movement history, road structure and gesture for anticipatory avoidance of danger

Preparation for latent risks



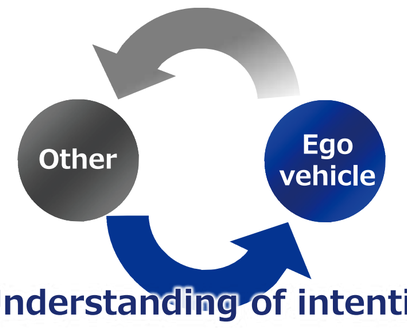
Anticipation of latent risk to help ensure a safety margin in advance

Safe and smooth driving like that of an experienced driver via cooperative action with other traffic participants

Negotiating merging during a traffic jam

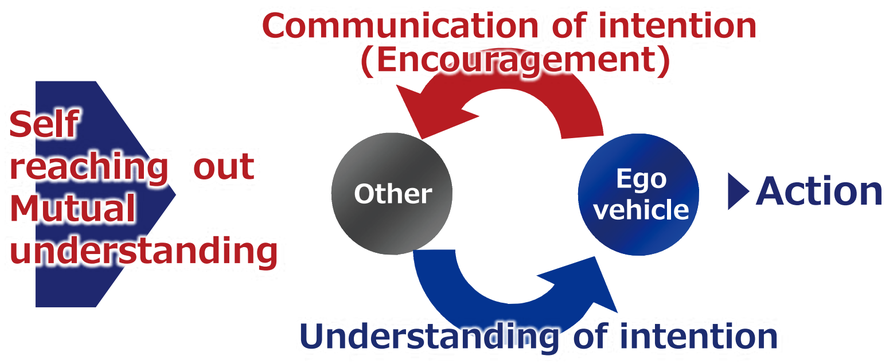
Mutual giving way in construction area

Conventional



Acting in coordination with other traffic participants

Interactive AI



Reaching out to surrounding traffic participants and understanding intentions

Taking action while coordinating with the surrounding environment

HONDA
The Power of Dreams

L3Pilot
Driving Automation

1,000 drivers 100 cars 10 European countries Piloting Automated Driving on European Roads

Honda is member of a Pan-European Level 3 AD Pilot (Pilot Operation Test) Project, funded by the European Commission under Horizon 2020, to test automated driving on public roads. Due to the higher dynamic requirements and the differences in European countries, challenging situations can be identified and used as a basis for competitive Honda AD functions globally.

Projectdetails

Duration: 48 months,
September 2017 - August 2021

Budget: €68 million
Coordinator: Aria Etemad,
Volkswagen Group Research

Funding and support: Co-funded by the European Union under the Horizon 2020 research and innovation program under grant agreement No 723051 with €36 million.
Supported by the European Council for Automotive R&D (EUCAR).

Working groups and Honda's contribution

Code of Practice
Partners will define a set of rules for system engineering and safety validation for automated driving functions.

Methodology
A multidisciplinary evaluation methodology developed by the project will facilitate reliable testing results for piloting automated driving.

Fleet
Honda participation
100 passenger cars from different European automotive manufacturers will be equipped and prepared for testing.

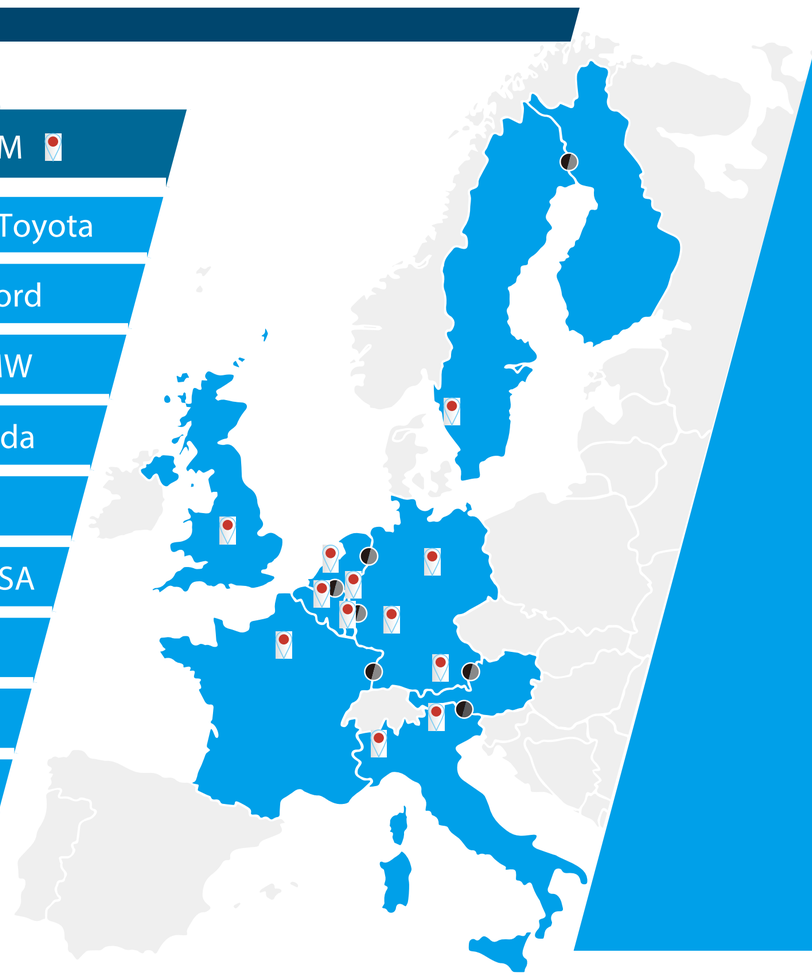
Data
Honda participation
A set of tools will enable logging, management and analysis of the various data acquired during testing.

Piloting
Honda participation
The tests across 10 European countries will be coordinated and harmonised. Showcases will present the functionalities to various audiences.

Evaluation
The evaluation will draw conclusions on technical aspects, user acceptance, driving and travel behaviour, and impact on traffic and society.

European Countries to be covered

CROSSBORDER		COUNTRY/ REGION /OEM	
Austria	Germany	*BE* / Brussels / *NL*	Toyota
Austria	Italy	*DE* / Aachen	Ford
Belgium	Germany	*DE* / Munich	BMW
Belgium	Netherlands	*DE* / Offenbach	Honda
Finland	Sweden	*DE* / Wolfsburg	VW
France	Germany	*FR* / Paris and other regions	REN /PSA
Germany	Netherlands	*IT* / Turin and Trento	CRF
		LU / *NL*	Aptiv
		SE / Gothenburg	Volvo
		UK / Coventry	JLR



Consortium

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723051.

Supported by the European Council for Automotive R&D

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Honda SENSING

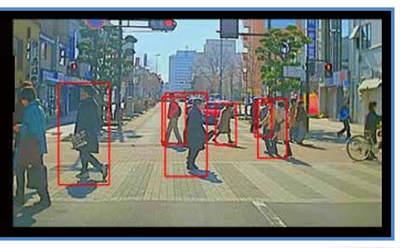
Honda launched “Honda SENSING” system with a combination of a monocular camera and a millimeter-wave radar in 2014. The application of this system has been expanding to more models.

System Configuration

Driving Support not only for daily driving but also for collisi

Responds to diverse accident scenarios

Camera
Recognition of target object attribute and size



Camera → Image recognition → Integration of sensor data / Vertical control system function / Horizontal control system function

Responds to high speed

Radar
Recognition of target object position and speed

Monocular Camera

In case of CIVIC

Millimeter-wave radar

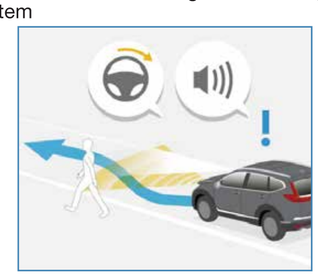
With further improvement in performance, the millimeter-wave radar expanded its scope of detection to include pedestrians regarded as being hard to detect due to their low rate of radio wave reflection as well as the position and speed of target objects. In addition, the monocular camera realized higher accuracy of detection by identifying the size and attributes of pedestrians or target objects with a distance of approximately 60m or less from the vehicle.

Applied Function

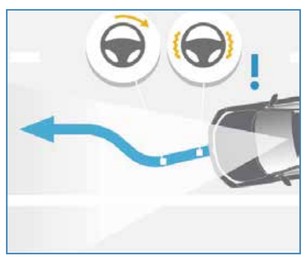
AvoidanceSupport

Collision Mitigation Braking System(CMBS)

Pedestrian Collision Mitigation Steering System



Road Departure Mitigation System



Collision Mitigation Throttle Control

Rear Collision Mitigation Throttle Control

Activesafety

Adaptive Cruise Control (ACC) with Low-Speed Follow

LKAS (Lane Keeping Assist System)

Lead Car Departure Notification System

Traffic Sign Recognition

Auto High Beam Headlights

iACC
Provide more comfortable ACC by cut-in prediction

Traffic Jam Assist (installed in 2018 model year Acura RLX for North America)

Working in conjunction with Adaptive Cruise Control with Low Speed Follow, Traffic Jam Assist helps reduce driver stress in highly congested traffic situations by helping keep the vehicle in its lane and a set interval behind a car detected ahead.

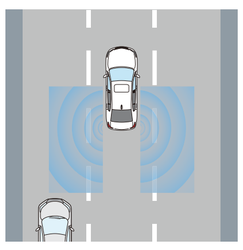
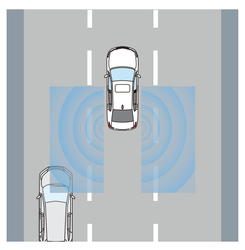
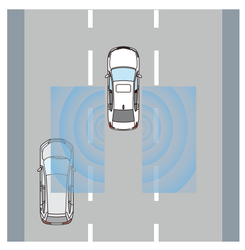
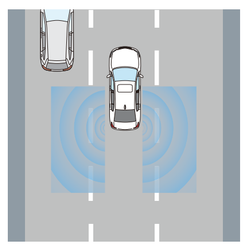
Other driving assist functions

Driving assist function to support side and rear safety of vehicles

Side safety

Blind Spot Information (BSI)System

Image of operation

	No Car Detected	Car Detected	Turn Indicator Activated	Car Moves Away
				
Indicator	Off	On	Blinking	Off
Alert sound	None	None	Beep Beep…	None

Rear safety

Rear wide camera

Backing out support

Parking sensor system

Multi-view camera system

There are limitations to the capabilities of each function (detecting capability or controlling capability) of Honda SENSING.
Please do not overestimate the capabilities of each function and drive safely while always paying close attention to the surroundings.

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The Power of Dreams

U.S. Smart Mobility Corridor V2X Pilot Deployment

Honda will deploy SAFE SWARM™ related V2V and V2I applications on 200 connected cars driven on the 33 Smart Mobility Corridor between the Columbus, Ohio area and Honda R&D Americas, Inc. The SAFE SWARM concept connects vehicles on the road, creating a smarter car that helps the driver safely and efficiently navigate their surroundings.

This project aligns with Honda's holistic approach to future mobility—one that accounts for all road users and all aspects of a very complex transportation system. This project also showcases a strong partnership between Honda, the state of Ohio and the local community.

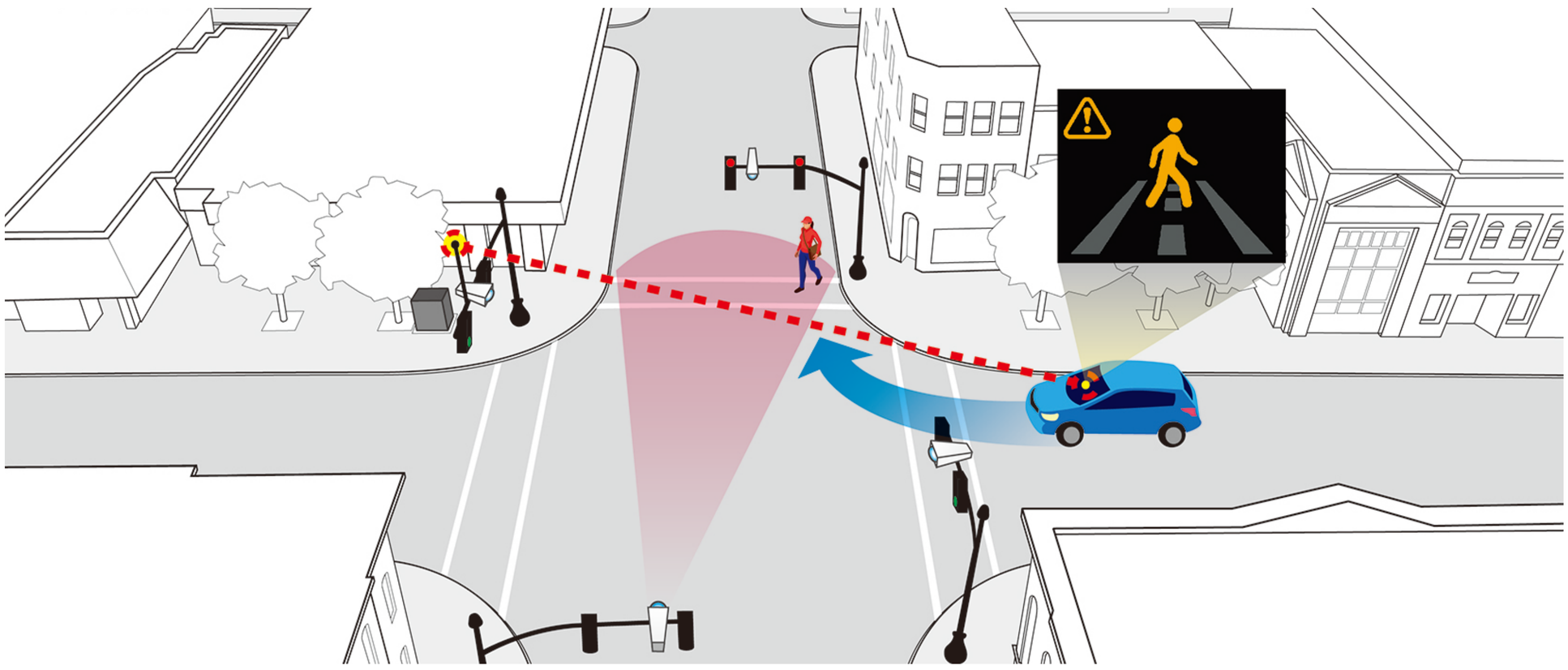
Honda welcomes more organizations to collaborate and leverage this unique high-density V2X environment toward deployment.

Smart Mobility Corridor

High-density V2X environment for innovative SAFE SWARM application

Smart Intersection

Use infrastructure to connect unequipped road users to connected vehicles



In addition to recognizing passenger and emergency vehicles, the system can also recognize pedestrians. This situation showcases the benefit of Honda's pilot V2I deployment.

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Data collection scheme and Battery service information in Demonstration Program

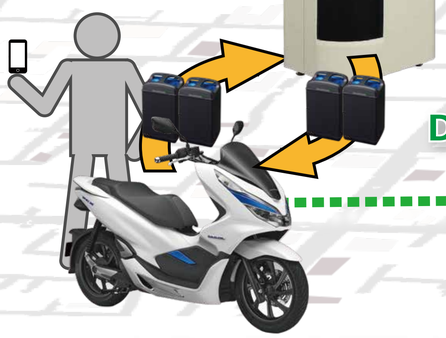
Honda Mobile Power Pack
(Portable, Swappable Battery)

Data Server

Battery Service information

Battery data

Driving data



PCX ELECTRIC

Battery data

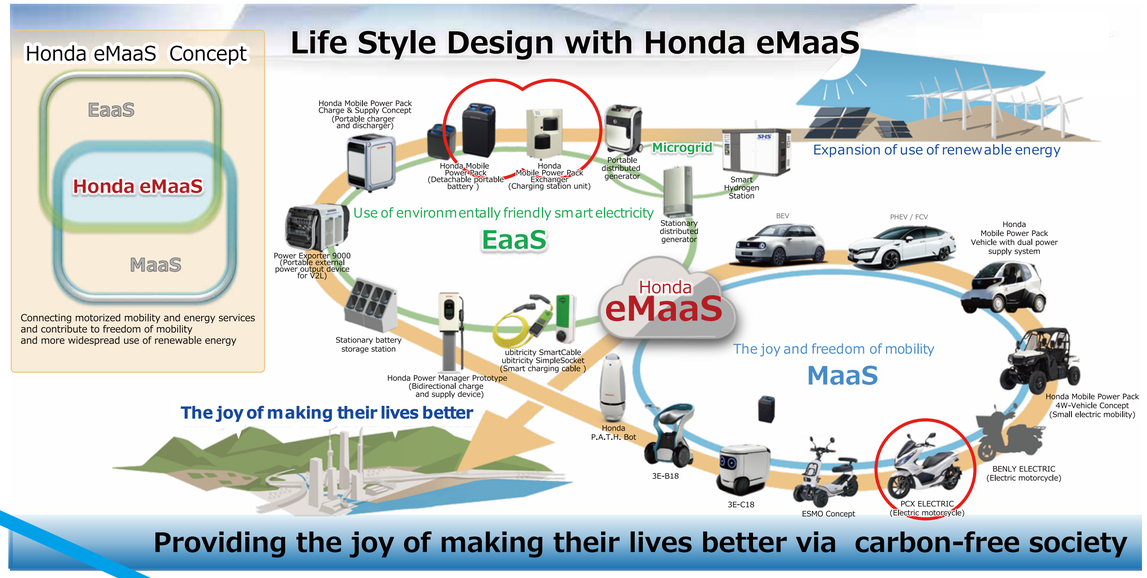
Driving data

Honda Mobile Power Pack Exchanger

Battery data

Driving data

Honda eMaaS



Operational data of Honda Mobile Power Pack & HONDA Mobile Power Pack Exchanger and driving data of PCX ELECTRIC are collected, and it is utilizing for battery sharing service etc.

Examination On-going

New utilization of V2X technology～Kakogawa City

加古川市 KAKOGAWA CITY

Purpose / Target

The city of Kakogawa promotes safe and Peace of mind city developing programs from networking people, security measures with government and citizens, traffic safety, anti-hazard, and hazard reduction to reach low in crime, accidents, and hazards. One to be noted is enhanced guardian service using V2X technologies connected with vehicles.

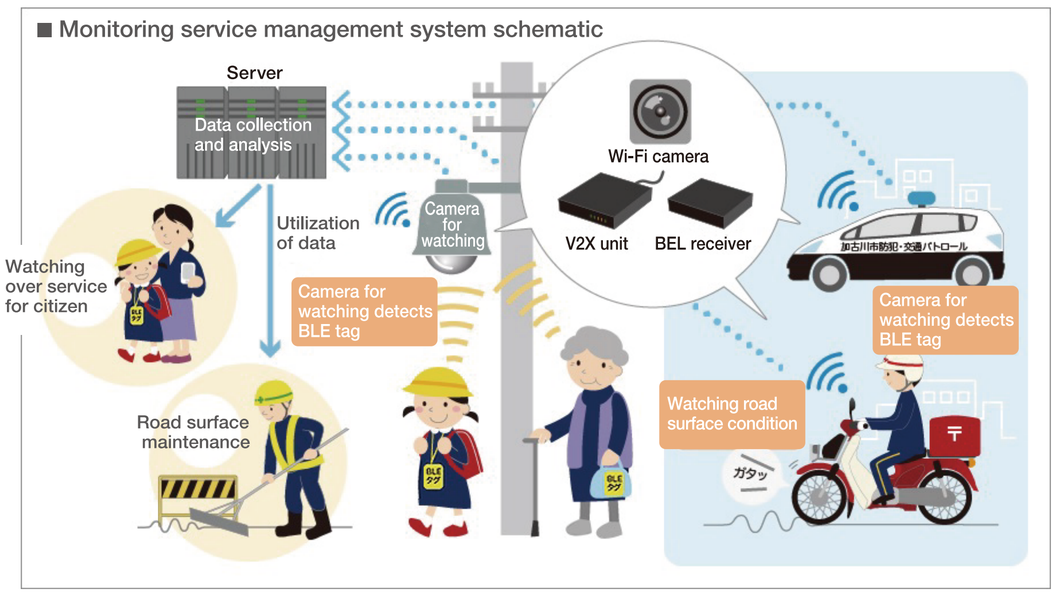
Summary of Program

Sufficient guardian service is provided with V2X technologies installed on commercial vehicles or security cameras.

Safety and pease of mind network using ICT

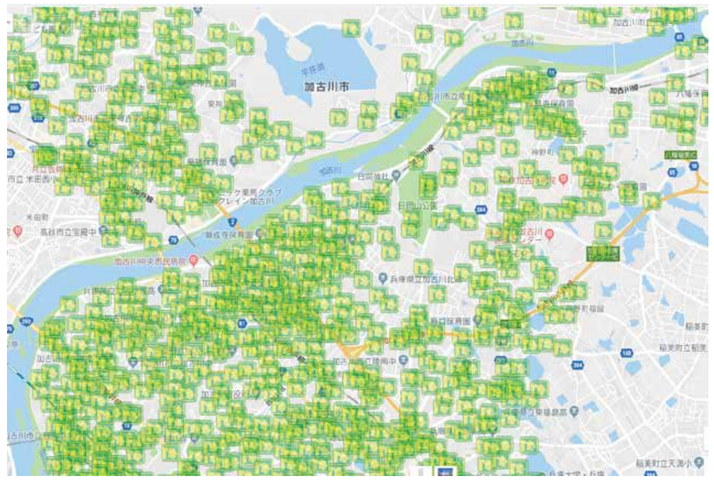
Anti-theft camera functions after the crime, a guardian camera confirms with prediction and foreknowledge.
Remotely operated through network.

Using commercial vehicles to enhance guardian network
Mobility brings someone is always watching for.



Effect / Implementing technologies

Safety and Peace of mind city development viewpoints contribute to anti-Theft or road condition monitoring (presented in video) in residences and neighborhood.



Camera locations in the city of Kakogawa, using V2X technologies

Japan Post Service vehicle detected the children (BLE tags) positioned locations

Ex: Japan Post Service vehicle and guardian camera detect tags.

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The Power of Dreams

Road Surface Condition Monitoring system

A demonstration experiment of Road Surface Condition Monitoring system using vehicle probe data in America.

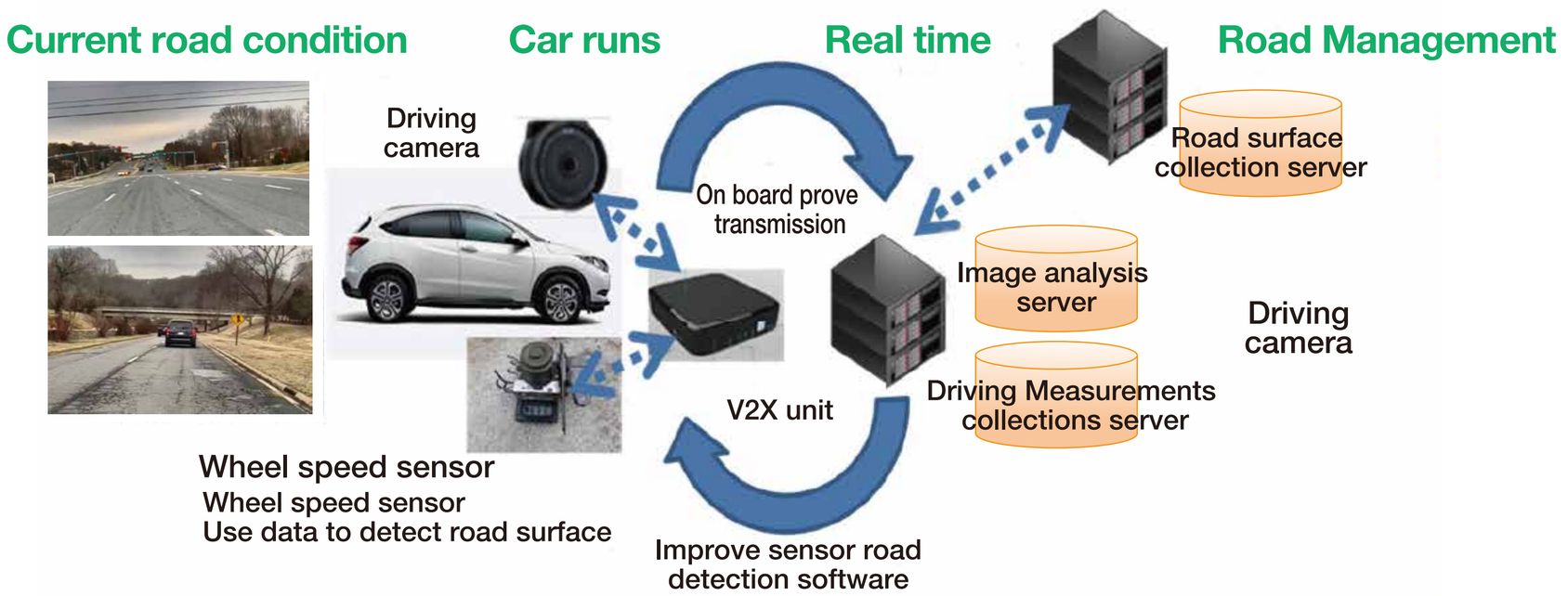
*This survey project was commissioned by Japan Ministry of Internal Affairs and Communications

Purpose / Target

A potential examination of a judgement system of road maintenance necessity, from vehicle probe data (locations, CAN(Controller Area Network) data) helps to analyze flatness of road surface to predict road condition deterioration

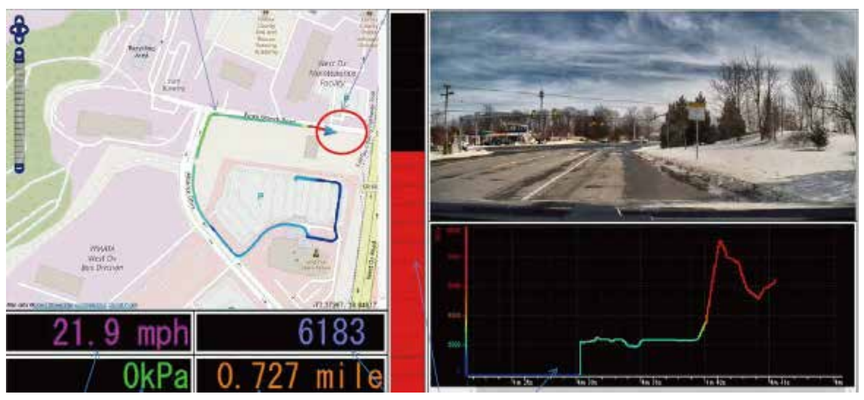
Summary of installations

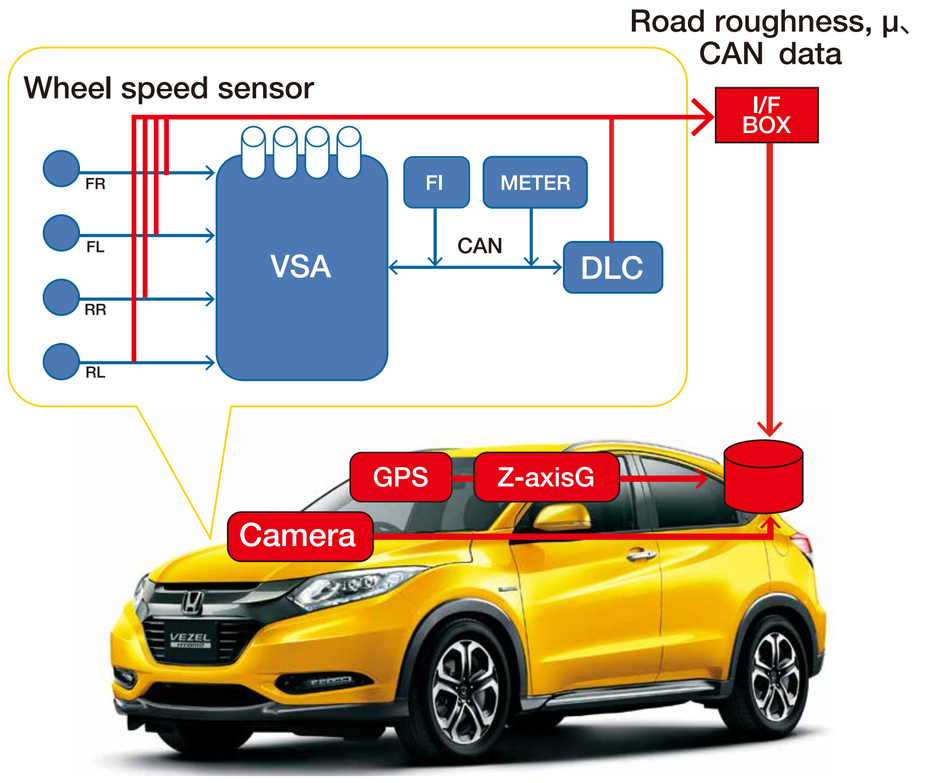
Road surface roughness is detected from data variations of wheel speed sensors and vehicle
The measurement vehicle is equipped with VSA* Wheel speed sensor , vehicle motion sensor and front camera to detect road conditions. sensors, road surface data is transmitted to a server using vehicle communication function with a vehicle positioned data.
Transmitted data is analyzed for deterioration growth to judge the necessity of maintenance.



Function / Mechanism

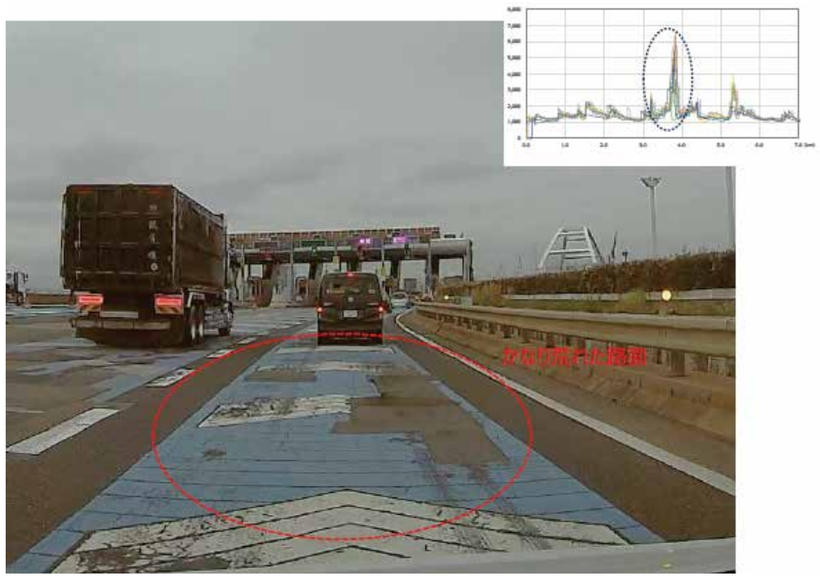
The measurement vehicle is equipped with VSA* Wheel speed sensor , vehicle motion sensor and front camera to detect road conditions.
*VSA: Vehicle Stability Asist





Effect/Performance

Correlation is confirmed between road roughness and examined over 10,000km driving in Japan and the US.



Road condition which has a large roughness

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The Power of Dreams

Examination On-going

A demonstration experiment of Anti-steal system for motorcycle, using Terrestrial Digital broadcasting in Brazil

*This survey project was commissioned by Japan ministry of Internal Affairs and Communications

Purpose / Target

In Central and South American countries, steal of motorcycles or automobiles become concerns therefore there is a need of introducing anti-steal systems with vehicle location identifiable tracking capability. We examine usefulness of the anti-steal system using inexpensive BLE with existing terrestrial digital broadcasting.

Summary of examination

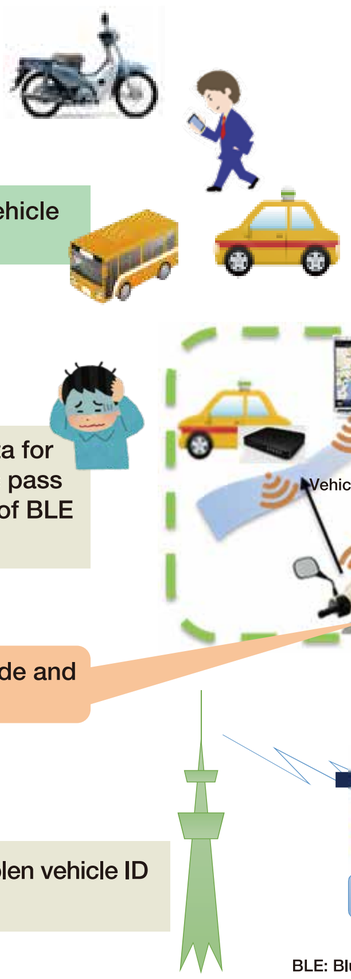
Vehicle's BLE ID (w/o GPS data)

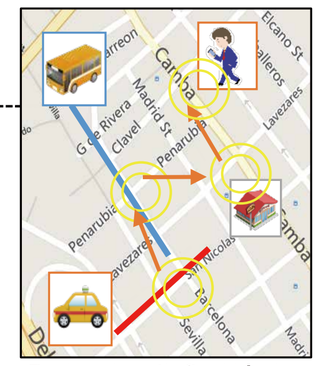
+

External Info (Position/time data for Vehicle BLE IDs obtained by probe vehicles)

=

By combining these data, positional data for vehicles can be obtained when vehicles pass by with one another (with the accuracy of BLE communication distance)




Tracking down theft vehicles by visualizing Vehicle ID, location of communication, and time

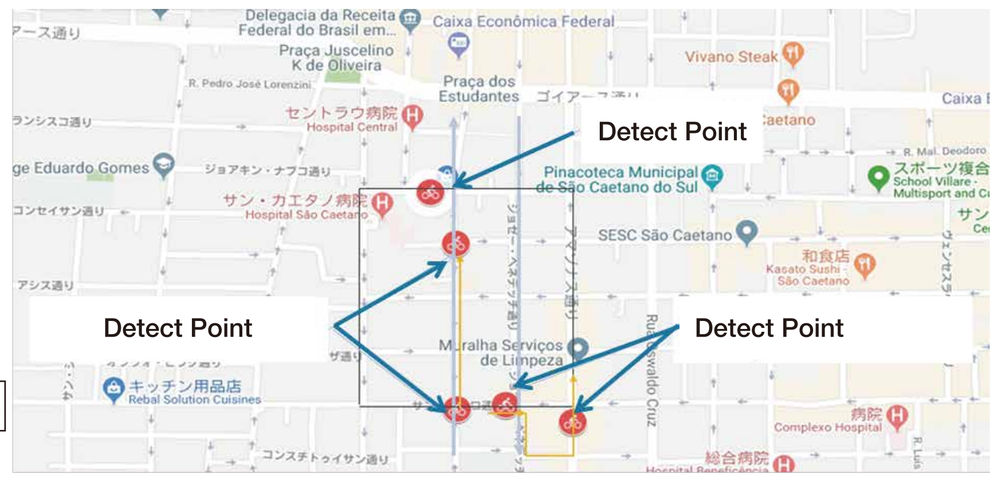
Embed BLE beacon on vehicle side and transmit vehicle ID

A dedicated carousel that delivers the stolen vehicle ID to a probe vehicle by a broadcast wave

BLE: Bluetooth Low Energy

Effect / Implementing technology

Result of stolen motorcycle tracking examinations in San Paulo



(A) State of stolen motorcycle serial detection at building streets
Identified stolen motorcycle escape route
Identified stolen motorcycle parked location

(B) State of stolen motorcycle serial detection in residential area
Identified stolen motorcycle escape route

(C) State of stolen motorcycle serial detection in residential area
Identified stolen motorcycle parked location

(search condition: 1 stolen motorcycle, 2 seeker vehicle, duration for 30mintes.)

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