Achieving a Society with Zero Traffic Accidents and Providing the Joy of Free Movement

Next-Generation Honda SENSING

In order to provide new value, aim at establishing functions that embody safe and seamless autonomous driving and driving assistance that people can enjoy with peace of mind for the entire way from home to their destination

Vision

[Achieving a Society with Zero Traffic Accidents]

Develop the latest safety technology to strive for zero accidents

[Providing the Joy of Free Movement]

Being close to people and enjoying driving itself with peace of mind

Freeing yourself from driving to enjoy time spent traveling

Value

The “surprise” of a new traveling experience	"Wow"
“Zero” traffic accidents	"Zero"
Leaving “peace of mind and trust” up to the vehicle	"Trust"

Technology Characteristics

Wow — Eyes Off/Hands Off Parking Lot Summoning

Release from driving

Helps you forget that you’re moving

Zero — Risk Avoidance

Relief from the anxiety of traffic accidents

Substantially reduces accidents and human error

Trust — Route Guidance Driving Assistance

Leave things up to the vehicle with peace of mind

Leave route guidance up to the vehicle

Aiming to realize experiences that “make people want to go out more spontaneously” by using Honda’s unique technology

HONDA

Safe Fundamental Technology that Realizes Value Unique to Honda

Next-Generation Honda SENSING

Aim at making it to the end without any interruptions safely and securely with strong cognitive ability even in difficult scenarios, regardless of the weather or time of day

Technology Details

Highly Accurate Detection Sensor

Recognizes risk by detecting a wider range with higher accuracy than humans through a combination of different sensors

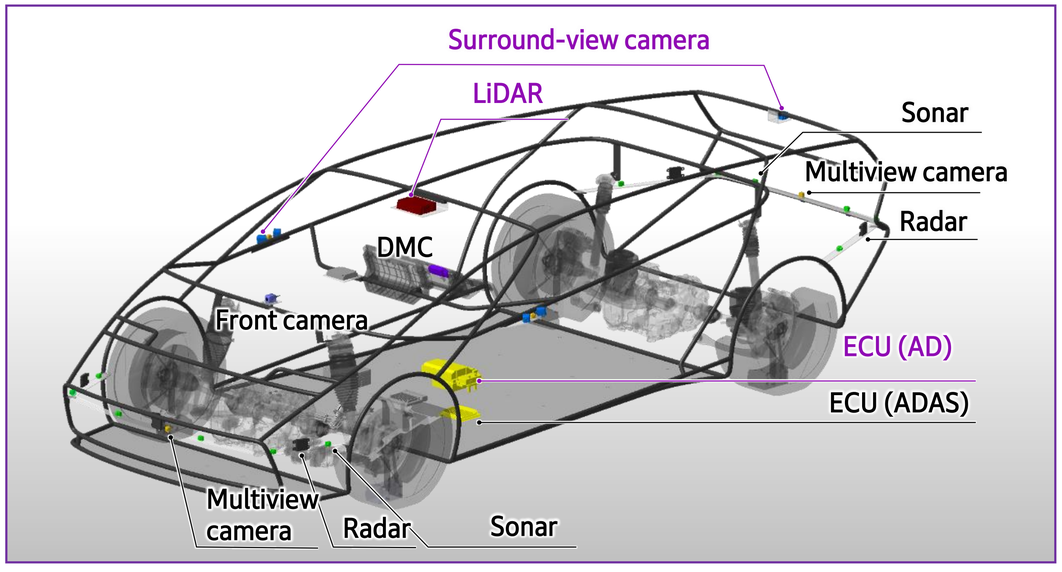
Characteristics

Strong against changes in the weather —— **Combination of LiDAR, radar, and cameras**

Highly accurate, highly reliable long-distance detection —— **LiDAR**

Strong at night —— **Surround-view camera (high dynamic range)**

Unique AI drive and sensor fusion —— **High-performance ECU**



Unique AI

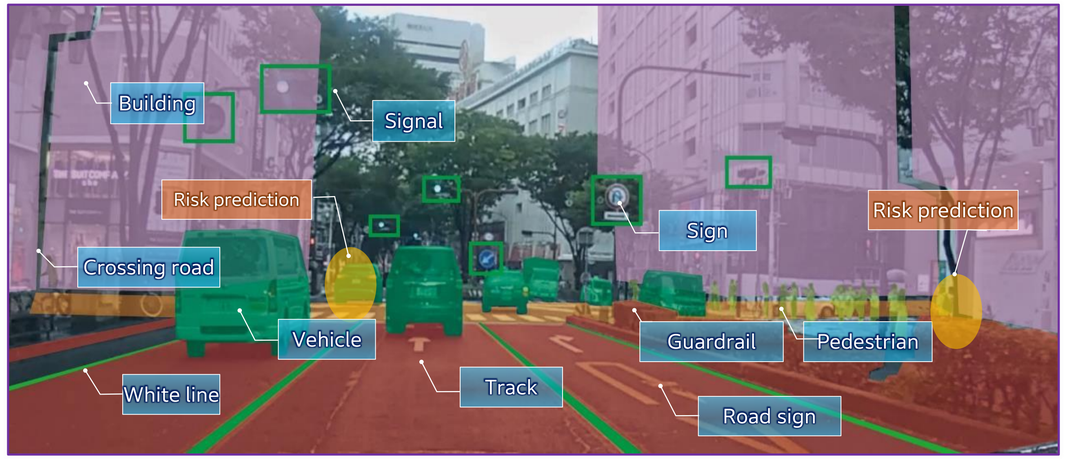
Concept learning at a heightened level of abstraction
Unsupervised learning

- **Expands the provided area in a shorter period of time than ever before**
- **Recognizes structures with almost all of the patterns in real time Enables eyes-off driving even in environmental changes and on roads being driven on for the first time**

+

Driver behavior model of experienced drivers

Predicts the behavior of objects like an experienced driver, enabling smooth avoidance.



Risk is recognized through highly accurate detection sensors, aiming for smooth avoidance through Honda's unique AI technology.

HONDA

Providing Small Devices Toward Zero Traffic Accident Fatalities

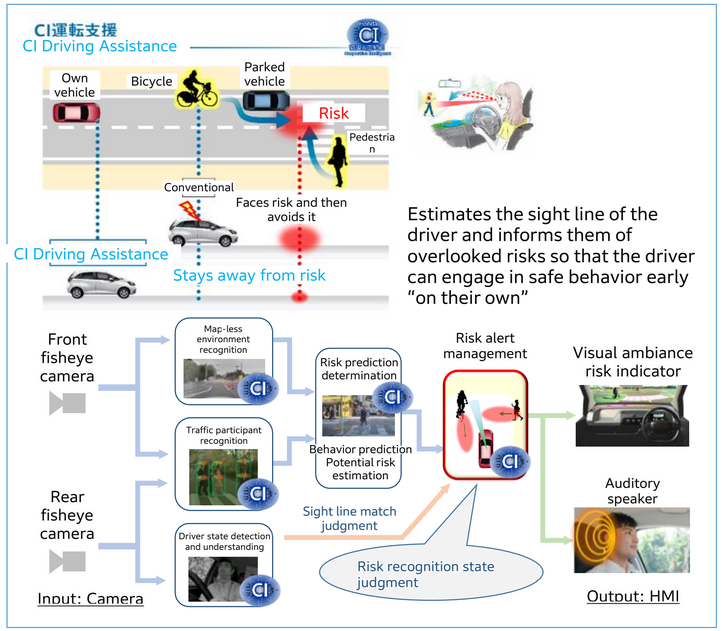
CI Driving Assistance Dashcam

*CI : Cooperative Intelligence

Aiming to provide a dashcam-type “CI Driving Assistance System” device that can be easily retrofitted onto both new vehicles and vehicles already in the market.

Technology Details

- 360 degrees of front and rear fisheye cameras are used to detect the traffic environment and participants to estimate risk level.
- A rear fisheye camera estimates the driver’s gaze to assess their risk recognition state.
- When the driver overlooks a risk, the system notifies them of the risk level and direction of risk through lights and sound.
- Features a mounting angle auto-calibration function, powered by image recognition, that enables retrofitting onto various vehicle models.



Mounting angle auto-calibration based on image recognition

Technology Characteristics

- Estimates the driver’s gaze to determine whether potential risks have been noticed.
- Notifies the driver of the level and direction of risks that have not been recognized, using lights and sounds.
- Easily retrofitted onto various vehicle models.

Can be easily retrofitted onto various vehicle models

Aiming to enable everyone to move freely and safely using the CI Driving Assist Dashcam, which provides a compact and Affordable 360-degree risk recognition system.

HONDA

Providing Applications Toward Zero Traffic Accident Fatalities

CI Driving Assistance Smartphone Application

*CI : Cooperative Intelligence

Aiming to provide a "CI Drive-Assistive Application," affordable and compact traffic alert system, to reduce traffic accidents involving motorcycles.

Technology Details

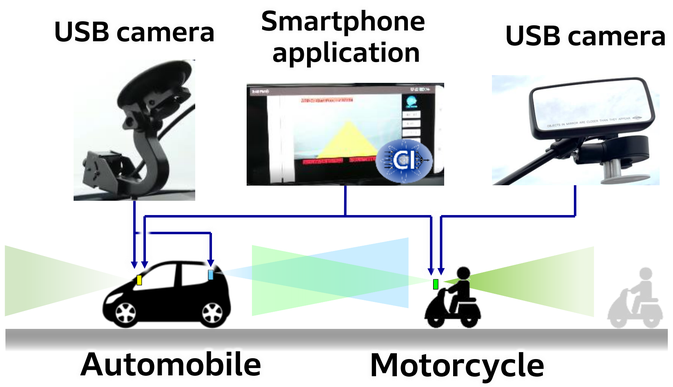
- Images from a USB camera are input into a smartphone, which uses lightweight CI to predict risks from motorcycles and automobiles approaching a vehicle from the rear, front, and sides.
- Vanishing point calculation and lane estimation using vehicle detection are computationally efficient and serverless, enabling accurate, lightweight risk estimation.
- Through collaboration with public agencies in Indonesia, the application is being tested on official vehicles and official motorcycles. Verification of safety and functionality is on-going, along with promotional activity.
- The screen of the smartphone changes color in a wavy pattern for identifiable and intuitive risk notification, even in a noisy environment.

Technology Characteristics

- Affordable safety support system that can be used with just a smartphone application
- Collaborating with public agencies in Indonesia on safety verification, functionality verification, and promotion

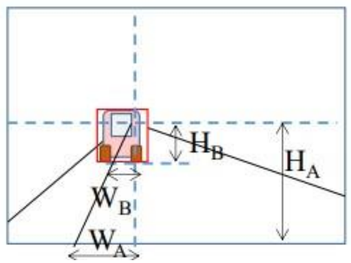
References:
- Mobile Alert System Using Lane Detection Based on Vehicle Clustering, *2024 IEEE 12th International Conference on Intelligent Systems (Best Paper Award)*
- Detection of Encroaching Vehicles based on Combination of Deep-Learning-Based Object Detection and Heuristics, *2025 IEEE System Man Cybernetics*

Affordable System Compatible with Motorcycles and Automobiles



Uses lightweight CI to predict risk at the rear, front, and sides of the vehicle

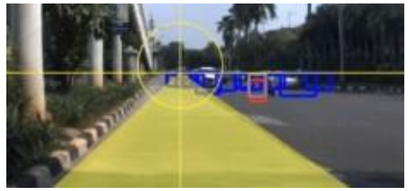
Server-less Vanishing Point Calculation

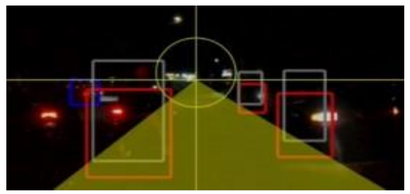


Screen to be captured by the onboard camera

Makes estimates using vehicle detection results so that it is near the center of the screen

Lane Detection Using Vehicle Clustering



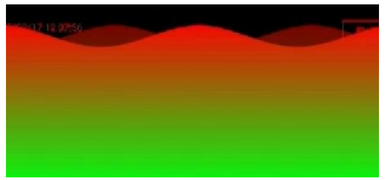


Own vehicle lane estimation (yellow area)

Estimates lanes from the travel paths of each vehicle even when there are no lanes or visibility is poor

Collaboration with Indonesian public agencies

Verification on official vehicles



Intuitive risk notification even in noisy environments

Aiming to enable everyone to move freely and safely by using the "CI Driving Assistance Smartphone Application".

HONDA

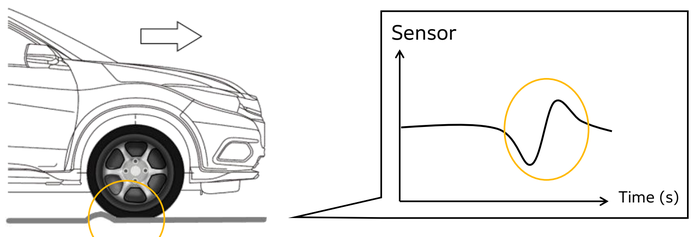
Utilization of Vehicle Data (Infrastructure Management) Toward Zero Traffic Accident Fatalities

Road Hazard Monitoring System

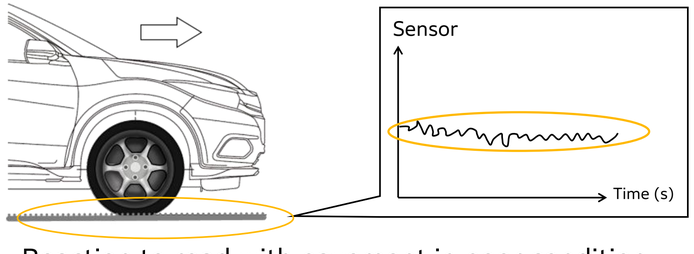
Utilizing mass-produced vehicle data enables real-time assessment of road conditions and deterioration prediction, facilitating more timely and cost-effective road maintenance.

Technology Details

- Road damage is scored by leveraging mass-produced vehicle data (location, speed, G-sensor, etc.).
- Road damage locations are visualized on GIS and highly damaged areas are identified by setting thresholds.
- Aging analysis of historical data enables identification of rapidly deteriorating areas and prediction of future road damage.



Reaction to local protrusion in the road (single road protrusion)

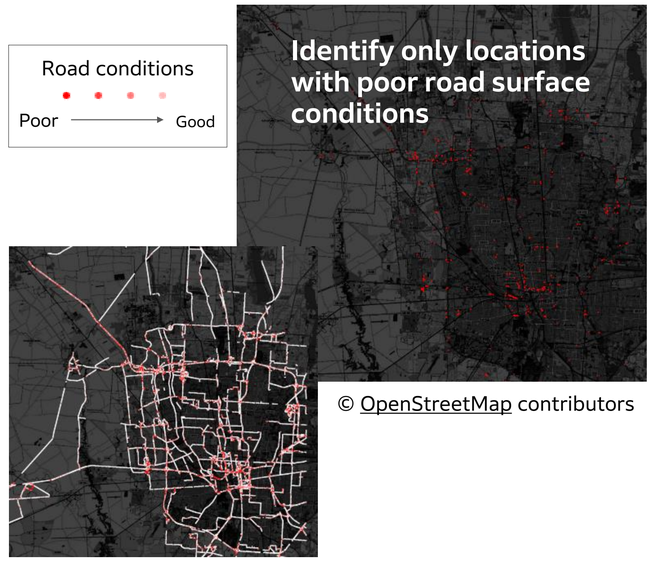


Reaction to road with pavement in poor condition (rough road)

Technology Characteristics

- Enables comprehensive monitoring of road damage conditions, including on local residential roads
- Enables real-time monitoring of road damage conditions
- Setting an appropriate threshold enables prioritization tailored to the conditions of each region
- Analyzing deterioration over time enables prediction of future deterioration

GIS Map Visualization



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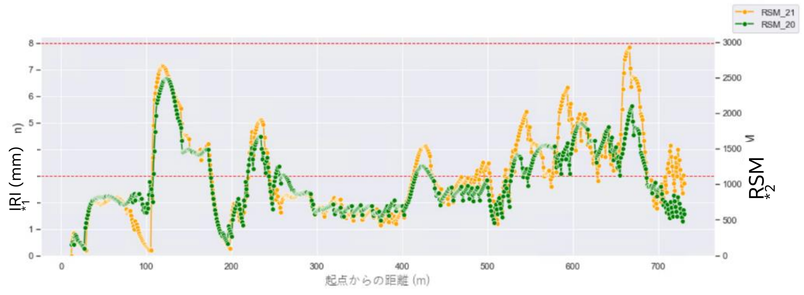
Aging Analysis Using Historical Data



Distance From Starting Point (m)

*1 IRI (International Roughness Index): International standard indicator for road flatness
*2 RSM (Road Surface Monitoring): Indicator for showing road flatness that is unique to Honda
*3 – – – – – –: General road surface control reference numeric value

Efficient management of various road infrastructures beyond road surfaces will be enabled with anticipation of the future spread of autonomous driving technologies.

HONDA

Utilization of Vehicle Data (Infrastructure Management) Toward Zero Traffic Accident Fatalities

Road Hazard Monitoring System

Since 2023, Honda and Ohio DOT have been jointly testing a real-time vehicle-data based road maintenance system to enhance operational efficiency, responsiveness, and safety.

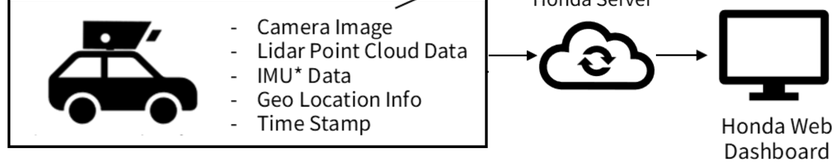
Department of Transportation

DriveOhio

Ohio DOT Project Outline

Powered by

University of Cincinnati · i-Probe · PARSONS



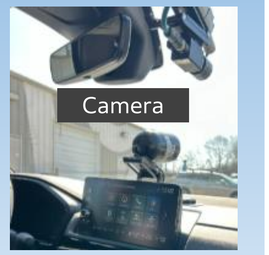
Road Deficiency Types

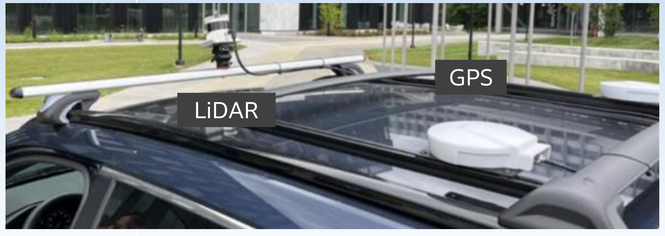
*IMU: Inertial Measurement Unit – a device that detects 3-axis angle and acceleration

Technology Details

Sensor Parts

Two cameras and LiDAR monitor the conditions of roads including road roughness, potholes, lane markings, guardrails, and road signs.





Setting PCs

All settings can be configured via two PCs installed in the trunk compartment.

Display Monitors

Inspection details can be checked in real time via multiple monitors in the cabin.

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Services and Technology Unique to Honda Toward Zero Traffic Accident Fatalities

Honda Driver Coaching Service with Driving Diagnostics and Verbal Advice

Provide real-time driving diagnostics and verbal advice using vehicle data, as well as detailed education content according to diagnostic results.

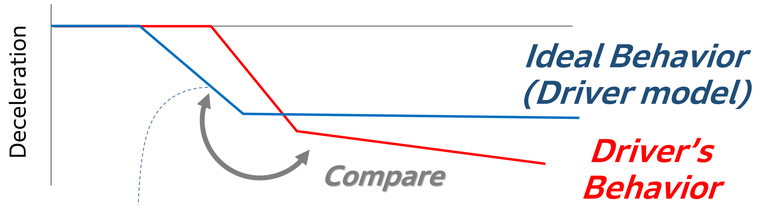
Technology Details

- Vehicle communication data is acquired through smartphones to diagnose driving behavior in each driving scenario in detail using experienced driver models.
- Not only does it display content based on diagnostic results, but it also provides timely advice based on driving operation while driving, supporting the same safe driving technique acquisition and safety recognition improvement as those of experienced drivers.

Technology Characteristics

- Communication data and driving behavior models are used to diagnose driving in real time through a smartphone.
- Verbal advice is provided in a timely manner, supporting the acquisition of safe driving.
- Detailed educational content is displayed based on diagnostic results.

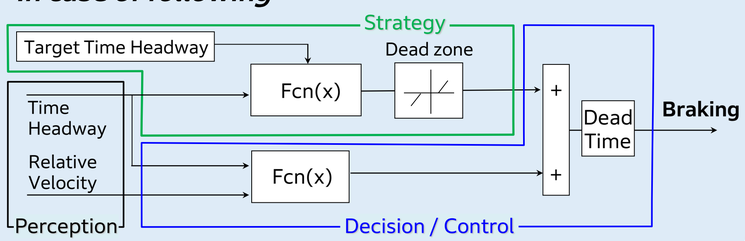
Diagnostic Method



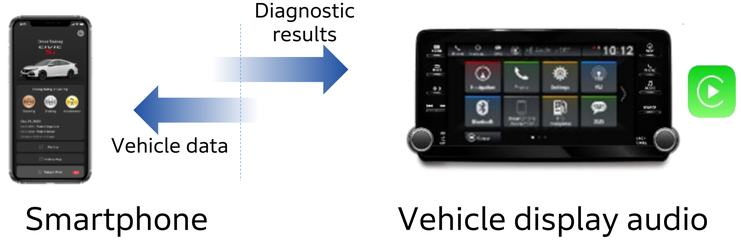
Driver Model

Developed for each driving scene

In case of following



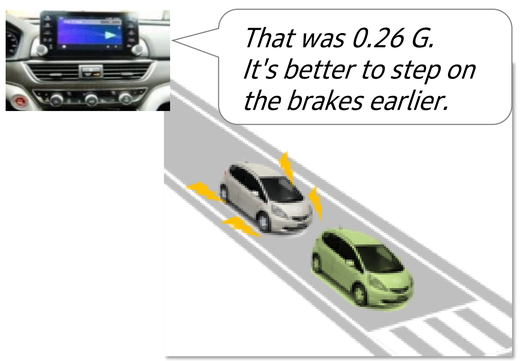
System Configuration



Smartphone

Vehicle display audio

Educational content



Advice while driving

Applicable Vehicle Models

- Accord (2018–2020 and 2023 or newer)
- Civic (2019–2020 and 2025 or newer)
- Civic Type R (2021 or newer)
- CR-V (2020 or newer)
- HR-V (2023 or newer)
- Pilot (2023 or newer)
- Integra (2023 or newer)
- Ridgeline (2024 or newer)
- MDX (2024 or newer)
- Odyssey (2025 or newer)
- Passport (2026 or newer)

Supports the acquisition of driving technique/safety recognition for younger people at a higher risk for accidents.

HONDA

Honda's Human Factor Research Toward Zero Traffic Accident Fatalities

State Estimation Technology Aimed at Reducing Accidents in North America

Aiming to estimate the alcohol-impaired state and the emotional state leading to aggressive behavior, then mitigate risk through intervention technology to reduce accident fatalities from risky driving.

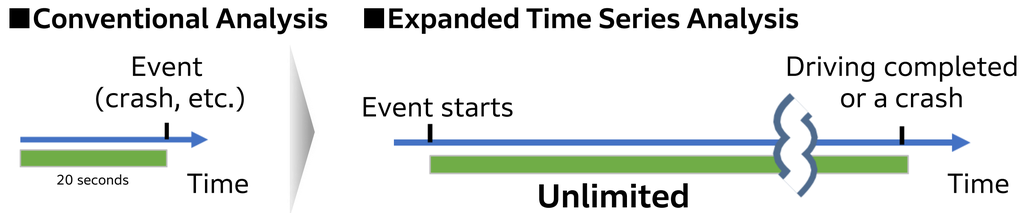
Technology Details

- The analysis interval for the naturalistic driving study(NDS) data set is expanded, and the time series features are identified in detail.
- Driver features such as facial expressions and body movements are detected by the driving monitoring camera.
- Estimation models are constructed that include features in the driving simulator, in addition to NDS.
- Techniques are developed to enable appropriate intervention based on the situation.

Technology Characteristics

- Unique analysis of the world's largest NDS (SHRP2)
- Models with a high estimation accuracy are developed based on driver features extracted in the real world.
- Appropriate intervention is created based on the situation.

NDS Unique Analysis



Provides a deeper understanding of real-world driving features through analysis of driver condition time-series changes, which conventional methods fail to capture.

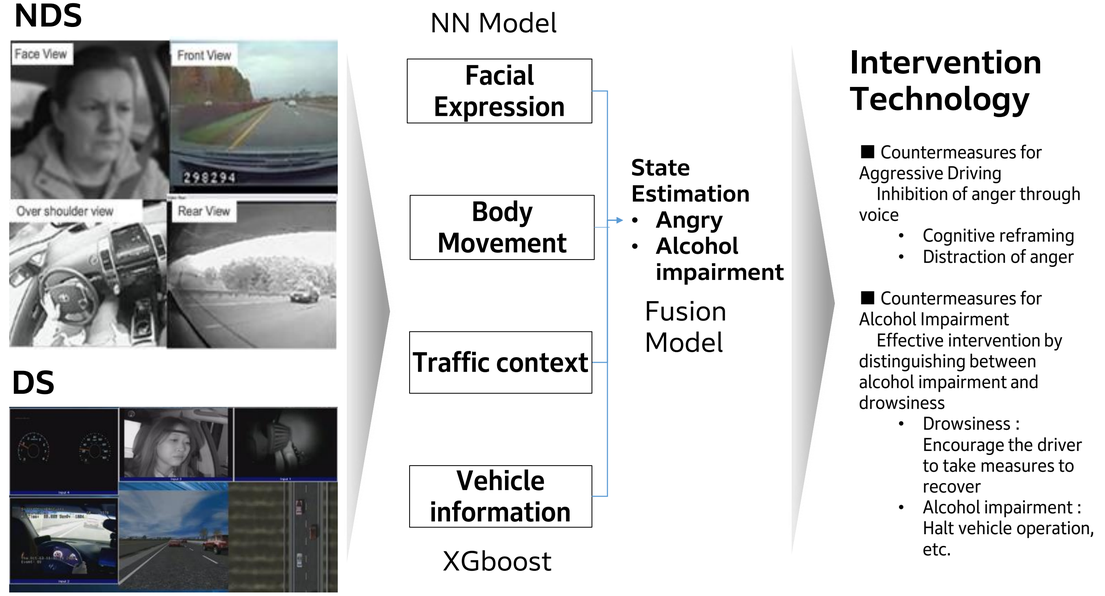
Facial Expressions/ Body Movements

Facial Expressions	Eyebrow movement Eye movement Blinking Mouth movement ・ ・
Body Movements	Hand position and movement Gestures when removing hands from the steering wheel Body movements ・ ・

Driving Behavior

Related to judgment errors	Driving by weaving through lanes Short distance between vehicles Illegal passing Speeding violation ・ ・
Related to operation errors	Sudden braking Overlooking signs Inappropriate turn ・ ・

Estimation/Intervention Technology



Addressing driver-caused risks will contribute to reducing accident fatalities due to risky driving in North America.

HONDA

Getting Students in North America on the Road to a Collision-free Future

Safety Driven

An education program where students learn safe driving through educational resources and activities to cultivate the next generation of safe drivers

educate Safety Videos

The Science and Behavior of Safe Driving: It Takes All of Us

Virtual Field Trip Overview:
The virtual field trip and its resources aim to educate students about the importance of safe driving and the innovative efforts by Honda to achieve a collision-free future.

Video Key Segments:
- **On the Road to a Safer Future:** Discover Honda's cutting-edge testing facilities and their commitment to zero deaths.
- **Strapping in for Driver Safety:** Understand the science behind seatbelt safety through crash test dummy data.
- **Know Your Limits:** Explore the physics of reaction time and stopping distances at high speeds.
- **Pedestrian Safety:** Keeping Everyone Safe through awareness practices

train Interactive Game

Crash Course Interactive: Understanding Speed and Collision Forces

Overview:
- Immersive Learning Experience: Students learn about the principles of speed and the forces involved in traffic collisions through a real-time crash testing scenario.
- Highlight the importance of modern safety features.

www.hondasafetydriven.com

coach Experts Advice

New: Launching October 2025

Honda's Winning Formula: It Takes All of Us

Overview:
A two-part video series introducing middle and high school students to Honda Racing & Powersports. Students will learn from Honda racers and riders about their habits and behaviors that keep them safe while racing. Students will also learn the importance of teamwork, technology innovation, and safety's critical role in racing and how it translates to real-world road safety.

Educational activities that encourage safe driving learning and creative problem-solving through these three approaches

HONDA

Consortium Activity for the Popularization of C-ITS Technology for Motorcycles Toward Zero Traffic Accident Fatalities

Joint Development of C-ITS Communicators for Motorcycles

Work together with motorcycle and automobile OEMs on research, development, and promotion of the international standardization of communication with automobiles that use C-ITS* and cost reductions for mass-production issues.

***Cooperative-Intelligent Transport Systems for motorcycles**

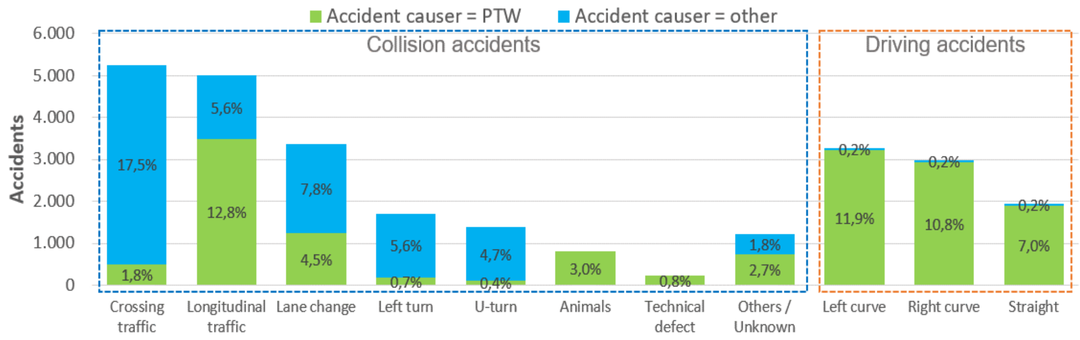
Technology Characteristics

Technology to prevent motorcycles from being overlooked

- Detect motorcycles lurking in blind spots through communication
- Notify/alert riders and drivers about the presence of automobiles and motorcycles
- Effective at intersections, during lane changes, during left turns, and at blind spots

Reason why accidents have not decreased:
Motorcycles are not recognized

Causes of Accidents in PTW Scenarios



Activity Details

The CMC (Connected Motorcycle Consortium) was established by BMW Motorrad, Yamaha Motor Co., Ltd., and Honda in 2016.

1. CMC Activity

1st Period (2016–2020): Established and standardized basic specifications. Unveiled on the website in 2020.
2nd Period (2021–2023): Coordination with automobiles and demonstration tests. A demonstration event was held in 2023.
3rd Period (2024–Present): Promotion of international standardization. Collaboration with other consortiums and government agencies.

2. Joint Development

Phase 1: Honda's motorcycle and automobile groups will work together to develop communicators. Aiming for putting Into practical use around 2028.
Phase 2: Ask motorcycle and automobile OEMs to participate. Publicly disclose specifications and carry out joint development.

CMC Members

BMW MOTORRAD, YAMAHA, HONDA, Hero, DUCATI, SUZUKI, MITSUBISHI ELECTRIC, TNO innovation for life, bertrandt, VUFO, CERTH, WIVW, nfiniity, ika, RWTH AACHEN UNIVERSITY, LA TROBE UNIVERSITY AUSTRALIA, Queensland Government, Technische Hochschule Ingolstadt, ifz, The Motorcycle Industry in Europe

External Organizations

CAR 2 CAR COMMUNICATION CONSORTIUM, 5GAA, EURO NCAP, data for road safety, ETSI, C-ROADS

Aim at the realization of a cooperative safety society in collaboration with not just the motorcycle industry, but with automobile OEMs and other stakeholders as well.

HONDA

Evolution of Honda Safety Technology Toward Zero Traffic Accident Fatalities

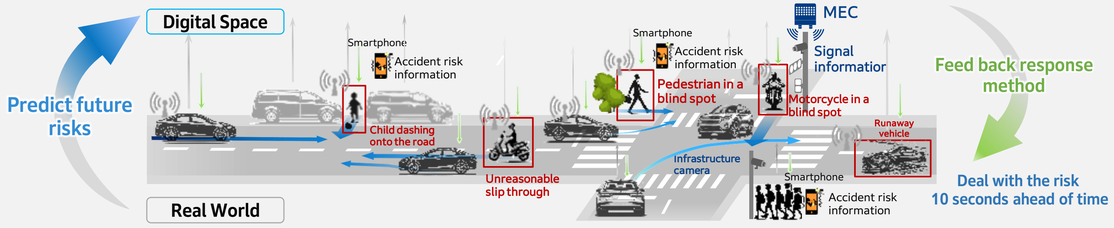
Safe and Sound Network Technology

Connect traffic participants through communication to encourage safe behavior for vulnerable people in traffic, including motorcycles, and aim for the realization of a traffic society where no one collides with anyone else.

Technology Details and Features

- The state and characteristics of each traffic participant are grasped to bring them together in a digital space through communication.
- Risk signs are captured comprehensively in the digital space, based on things such as the characteristics and states of each traffic participant.
- Traffic participants who appear to be at high risk are notified of response methods to avoid the risks in advance.

Accidents are avoided in advance through technology where the behaviors and states of all traffic participants are estimated and judged comprehensively to predict risk



Realization of a cooperative and safe society with every traffic participant working together

<Core Technology>

Understanding Human Characteristics

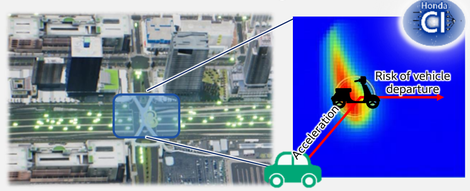
Estimations through vitals, conversations, etc.

Detects fatigue, stress, etc.

Integration risk estimation algorithm in consideration of human characteristics

Risk prediction 10 seconds in advance

Identifying comprehensive risk based on individual states and deriving workarounds



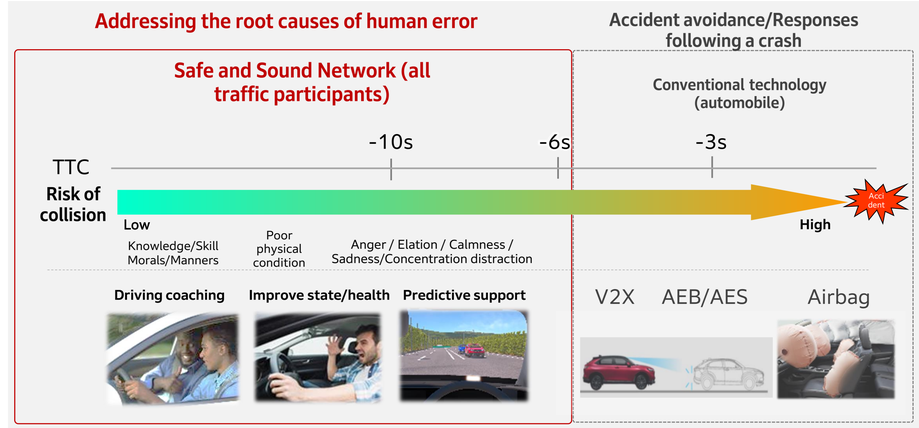
Synlogue based communication

Empathy through dialogue

Promoting the understanding of potential risks

The signs of risk from people are grasped to handle it before human error occurs

Concept



Examples of Public and Private Sector Collaborative Activity

- NEXCO Central (demonstration completed in FY2024)
  "Collaborative Road-Vehicle Communication Demonstration for the Autonomous Driving Era on Expressways"
- Cabinet Office (starting in FY2023)
  "Phase 3: Strategic Innovation Promotion Program (SIP) / Development of Smart Mobility Platform"

*Demonstration tests in cooperation with companies and organizations such as automobile/bicycle manufacturers and research institutes are scheduled for the Fall, FY2025 (Traffic Accident Preemptive Prevention R & D Consortium)

Promote the standardization of a collaborative platform through industry/public and private collaboration toward early-stage social implementation.

HONDA

Aiming at the Achievement of Carbon Neutrality

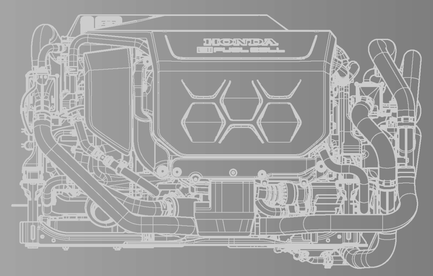
Next-Generation Fuel Cell Module

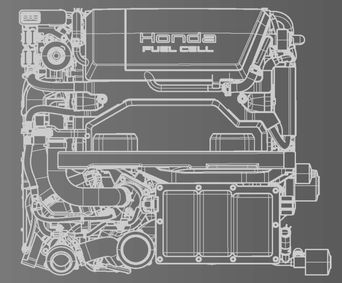
By enhancing the CR-V equipped fuel cell module, we aim to achieve high reliability and compactness by significantly increasing cost-efficiency, durability, and volumetric power density.

Major Specification

	CR-V equipped Fuel Cell Module	Next Generation Fuel Cell Module
Maximum output	78 kW	150 kW
Output voltage	275 – 600 V	450 – 850 V
Dimensions	W1070 x D738 x H705 mm	W730 x D580 x H700 mm
Weight	206 kg	250 kg
Maximum efficiency	56.8 %	59.8 %

NEXT





Power Density: more than **Triple**

Durability: more than **Double**

Cost: Half or less

*Compared to the fuel cell module mounted on the CR-V

HONDA

Aiming at the Achievement of Carbon Neutrality

Honda Fuel Cell Power Generator

A stationary power generator to supply clean electricity from hydrogen for large facilities such as factories and offices

Compactness and Flexible

Zero Emission

Fast response

Certification Standard

Zero Emission

Honda's fuel cell Power Generator can supply clean electricity from hydrogen to your facilities. The generator produces no exhaust gasses such as CO^2 or NOx, emitting only water as a byproduct.

Fast Response

This generator, compliant with NFPA 110 Type 10, is capable of instantly providing power as an emergency backup during unexpected power outages.

Compactness

With its industry-leading compact size and a range of output variations, the generator offers flexible installation options to meet your facility's specific requirements.

Quality and Reliability

Honda's fuel cell Power Generator comply with ANSI/CSA FC1 standards, ensuring that we deliver high quality and highly reliable products for your facilities.

Usage		Emergency Backup Power Generator
Output		Up to four 250 kW units (1,000kW total) can be connected in series. It can be configured in parallel based on 4 units to exceed a total capacity of 1,000kW.
Rated Voltage		AC 200 - 480 V / 60 Hz, 3-phase, 4-wire system
Compliant Standards		ANSI/CSA FC1 / IEC 62282-3-100
Startup Time		Within 10sec (NFPA110-Class X/type 10/Level 2)
Installation Environment	Temp.	-25 ~ 45 ℃
	Alt.	MAX 2,000m / Performance guaranteed 1,000m
Noise Level		76 dBA (@7m) or less
Exhaust		Zero-emissions (No CO_2, NOx)

We supply electrical power to address the diverse power needs of our customers and provide broad support, from product introduction through aftermarket service.

HONDA

Evolution of Honda Electrification Technology Toward Zero Environmental Load

Personal Charging Recommendations for Making an Electrical Lifestyle Smoother

Reduce the stress* from public charging that EV users encounter during en-route charging in order to convert the hassle of en-route charging into valid time.

***Stress 1: It's hard to make the most out of charging time, which feels like a long period of time *Stress 2: The driver could be guided to a charger that is not available**

Technology Details

User data
(voice interactions, user actions)

Vehicle data

Charger

Social media data

Image data

Selecting a High-Quality Charger

Charger	Index 1	Index 2	Index 3	Priority
A	5	2	5	3
B	5	5	2	Top priority
C	4	4	5	2

Data collection × Analysis platform × AI

Guides users to high-quality chargers and suggests way to spend time while charging is being done based on their preferences and trend analyses

Suggested content is displayed on a smartphone or IVI

Inferring interests

The following is the information of the stop points during my car trip in the same day. The information includes stop duration and possible visited places nearby the stop point in csv format. It's uncertain that which place is visited so please find out the most possible one from the relationship of stop points.

Stop point 1:
- Duration: 4.98 hour(s)
- Nearby places: <csv>

Distance,Category
51,Banquet Hall
55,828 Sales and Services
111,Tourist Information
128,Sporting Goods Store
109,Variety Store
118,Specialty Clothing Store

Identifies stopover locations based on stop position

Infers interests and goals based on stopover locations

<Interests> Children, Children's Museum
<Purpose> Family Outing

Technology Characteristics

	Technical Issues	Honda's Approach
Selecting a high-quality charger	Delay in updating information on charger availability	In addition to information disclosed by the CPO*, make full use of the vehicle acquisition data history related to charging that's stored on Honda's analysis platform to predict and determine whether they will be available. Provide that information to the user as soon as possible. ***CPO:** Charging Point Operator
	Failure determination of charger session to predict charger availability	Create characteristic volumes and their thresholds for each contact point with the user in the Customer Journey database related to user charging behavior to clarify at what point the user failed to charge the vehicle.
	Increasing the number of chargers that can be predicted	Actively utilize not just Honda's vehicle data, but also various external data, to sufficiently secure high-quality chargers that Honda can guide users to with confidence.
Suggesting ways to spend time while charging	Understanding users	Identify user profiles based on voice dialogue data from touch points and the movement history of the vehicle.
	Understanding the situation inside the vehicle	Perform state recognition through AI (time, weather, in-vehicle camera information, voice interactions, etc.) to modify the priority for charging destinations according to the situation.

Data collection and AI analysis help in guiding users to high-quality chargers and in making suggestions on how to pass the time while charging, providing a comfortable EV life.

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