지능형자동차부품진흥원

KOREA INTELLIGENT AUTOMOTIVE PART PROMOTION INSTITUTE

KIAPI

Be the BEST

Biggest Engineering Service Team

www.kiapi.or.kr

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Korea Intelligent Automotive Parts Promotion Institute

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KOREA
INTELLIGENT
AUTOMOTIVE PART
PROMOTION
INSTITUTE

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Message from President

KIAPI(Korea Intelligent Automotive Parts Promotion Institute) is an vehicle testing institute established in 2014 to support related parts suppliers and research institutes developing next-generation automotive technology. Considering that the development of next-generation vehicles, which consist of intelligent vehicles centered on autonomous vehicles and green cars such as electric cars and hybrid cars, are major activities of automotive companies, In order to facilitate the development of next-generation automobile technology in Daegu region, we have vehicle evaluation and testing facility and work on the needs of companies and research institutes.

We have facilities and test engineers to test chassis dynamo, impact durability test equipment, vehicle driving test in various conditions such as High speed circuit and Multipurpose test track. In particular, we have a system capable of various intelligent driving tests and related tests using wireless communication network(WAVE).

We will not only have a support system to cope with various next-generation automobile development of automobile-related companies and research institutes centered on Daegu region, but will continue to reinforce the support system in accordance with the changing market conditions in the future.

From President

KIAPI
지능형자동차부품진흥원
Korea Intelligent Automotive Parts Promotion Institute

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Summary of KIAPI

Purpose of Establishment /

Contributing to the strengthening and development of international advanced competitiveness of High premium auto parts industry and related industries through infrastructure construction and efficient management and operation to foster the rights of auto parts makers and to foster ITS-based automotive parts base valley

Summary of Foundation /

Denomination : Korea Intelligent Automotive parts Promotion Institute
Form of Establishment : Non-profit Foundation under Civil Code
No. 32(2008. 05. 06.)
Organization : 3 Headquarters and 1 Department

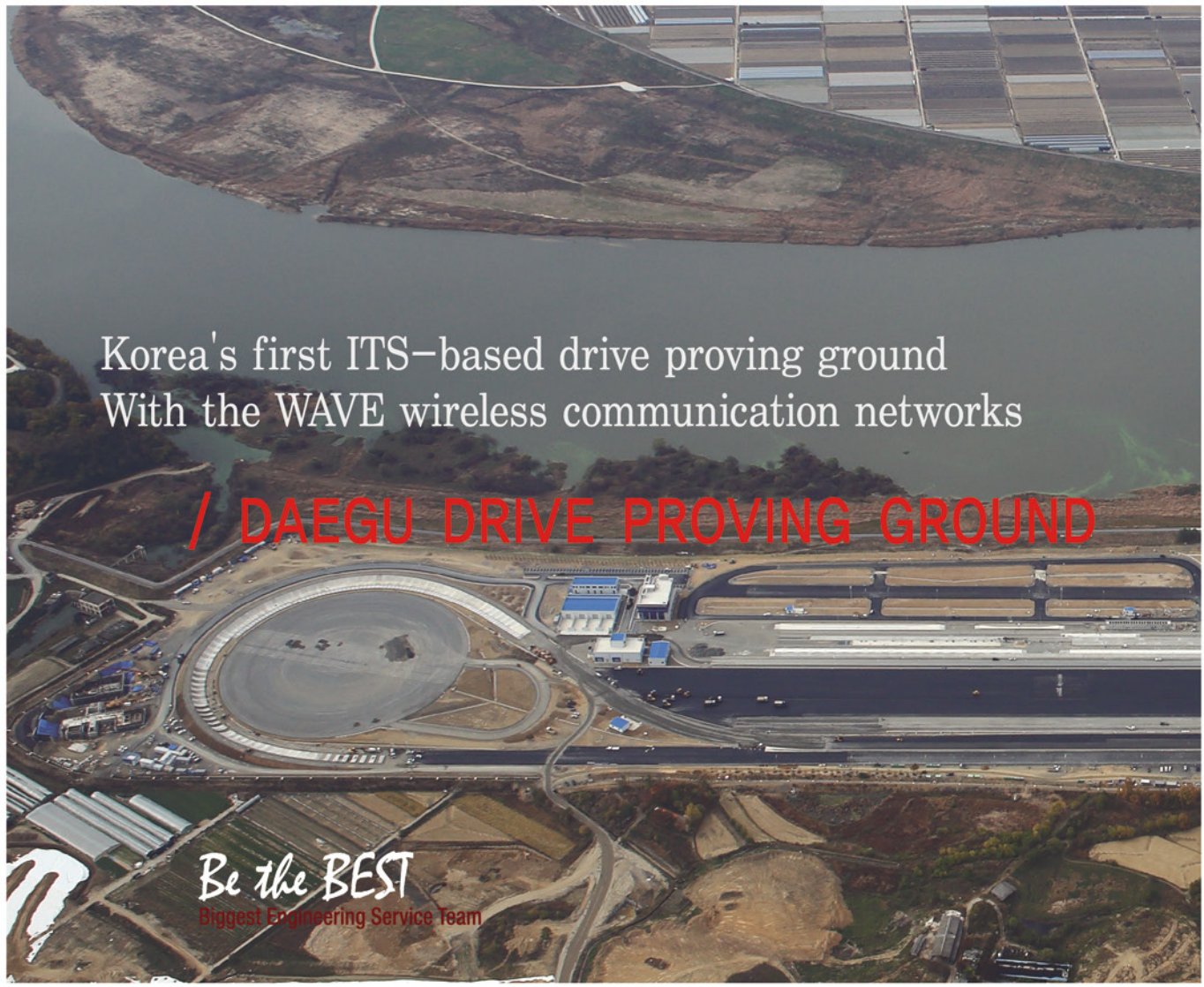
History /

2007. 12. 24.	Conclusion of a contract for establishing infrastructure for regional innovation
2008. 04. 02.	Permission to establish corporation (Ministry of Knowledge Economy)
2008. 05. 06.	Registration of Foundation
2008. 05. 30.	Foundation launch event (temporary board of directors)
2011. 04. 04.	Holding groundbreaking ceremony of proving ground
2014. 04. 02.	Completion of proving ground
2017. 03. 22.	Agreement of construction of test center for Renault group agreement

Status of proving ground /

Location : 201, Gukgasandanseo-ro, Guji-myeon, Dalseong-gun, Daegu, 43011, Korea.
Scale : test track of 394,565㎡ and operation of related equipment

Panorama of
KIAPI & Daegu Drive Proving Ground



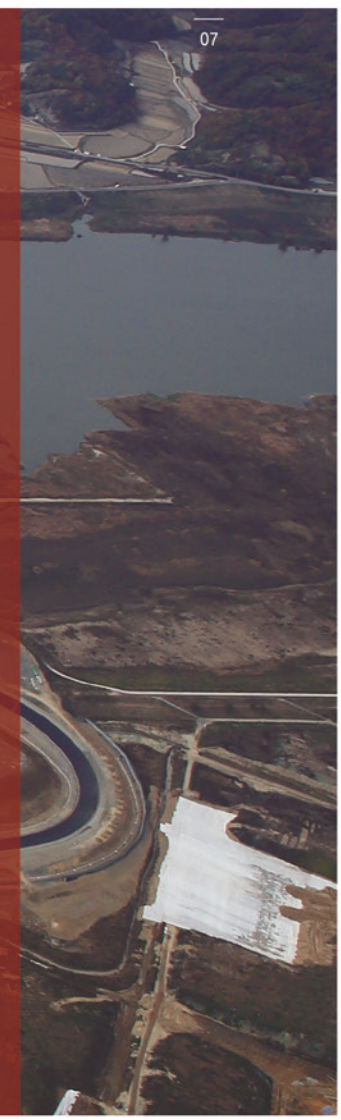
Panorama of KIAPI & Daegu drive proving ground

Daegu drive proving ground will support evaluation of parts of autonomous cars and ADAS for local auto parts suppliers with limited development and continuous growth due to changes in internal and external conditions, and to become a necessary facility in the local auto parts industry.

Major business

- Establishment of proving ground, management and operation of facility
- Performance test, research, evaluation and certification of automobile parts using proving ground
- Technical support and professional training of intelligent auto parts
- Construction of Infrastructure and R&D for development of intelligent auto parts
- Automobile parts related business entrusted by the government or local government

KIAPI 지능형자동차부품진흥원
Korea Intelligent Automotive Parts Promotion Institute



DAEGU DRIVE PROVING GROUD

Korea Intelligent Automotive Parts Promotion Institute

Daegu drive proving ground can carry out 37 items among test items of International Standard Certification Standard (ISO/TC) for intelligent auto parts and ITS Specialized Test of Future Cars.
We also perform hybrid environmental tests such as performance, durability and noise of general vehicles.
In particular, For the first time in the world, we have installed the most advanced intelligent transportation system that enables DSRC and WAVE technology, the next-generation wireless traffic communication, to test and provide information services between vehicles and between vehicles and centers.

A. Multipurpose test track
B. Pass by noise test track
C. Wet grip test track
D. Vehicle-infra connected test intersections
E. Special condition test track
F. High speed circuit
G. Steering pad
H. Wet handling test track
I. Hydroplaning track
J. Test hills

About
Daegu Drive Proving Ground

A. Multipurpose test track

It is a test track that can perform testing of ADAS related devices such as BSD, LDWS, LKAS as well as vehicle power related, braking related and related tire performance test which is difficult to carry out in high speed circuit or straight line.

Applications	- Vehicle power performance test - Vehicle braking performance test - Parts of ADAS performance test	- Steering stability test - Tire performance test
Specification	Size : length 440m × width 70m	

B.
Pass by noise test track

It is a test track which is located on a Multi-purpose test track and consists of road surface of ISO standard. It can perform tests to measure external and internal noises that occur during driving.

Applications

- Pass by noise test
- Internal and external noise test
- Sound quality and comfort test
- Tire noise test

Specification

- Size : length 560m × width 20m
- Certification road surface :
  ISO 10844, length 20m × width 3m

C.
Wet grip test track

It is a straight test track located at the side of the Multipurpose test track, and it can generate the water film of about 1mm through the spray nozzle installed at regular intervals to realize the wet road surface test condition. This allows you to test the characteristics of your tires, as well as anti-slip technologies such as ABS.

Applications

- Tire μ-peak measurement test
- Braking performance test
- ABS development test

Specification

- Size : Length 150m × width 4m
- Water film : about 1mm

D.
Vehicle-infra connected test intersections

A test track with two 4-way intersections and one 3-way intersection, created a road and traffic environment that fuses ITS to develop ADAS-related technologies through simulations of intersection conditions.

Applications
- Evaluation test of collision avoidance active safety system
- Pedestrian protection device test
- Active Brake Assist Device Test

Specification
- Size : Four lanes, length 382m × width 16.5m
- Composition : two 4-way intersections and one 3-way intersection, intelligent signal facilities, camera

E.
Special condition test track

It is a test track that can test the durability and vibration characteristics of vehicle and related parts in harsh environments such as impact, vibration, flood, etc., and provides a total of 13 different test environments, so that you can carry out the performance tests according to the conditions.

Specification

Road surface : Belgian road, Washboard road, Long waveform road, Body twist road, Mauvais pave road, 3 Bump road, Rough asphalt road, Pebble road, Stone chipping road

Flooding and corrosion : Flooding test road, Water tight test road, Deep water ford road, Salt spray corrosion test road

- Belgian road
- Washboard road
- Pebble road
- Body twist road
- Mauvais pave road
- 3 Bump road
- Stone chipping road
- Rough asphalt road
- Deep water ford road
- Salt spray corrosion test road
- Flooding test road
- Water tight test road
- Long waveform road

F.
High speed circuit

It is a test track in the shape of a telephone receiver, consisting of a straight line portion and a bank portion of one-way third lane. Based on the bank of curvature radius R=100 and the straight line with a maximum distance of 1.5 km, it is possible to drive up to a maximum speed of 204 km/h. Driving directions can be different according to test conditions.

Applications

- ACC (Adaptive Cruise Control)
- BSD (Blind Spot Detection)
- LDW (Lane Departure Warning)
- LCW (Lane Change Warning)
- DDW (Driver Drowsiness Warning)
- LKA (Lane Keeping Assistance)

Specification

- Straight portion : maximum 1500m
- Bank portion : Radius of curvature R=100m, slope30°
- Road width : one-way Three lanes
- Total length : 3681m
- Driving time : 2minutes 1second(100km/h)

G.
Steering pad

A round test track in the bank section of the high-speed circuit. There are 9 turning lanes to evaluate the turning ability, turning stability, and braking ability in various conditions.

Applications

- High speed steady state circular test
- Braking in curve test
- Minimum turning radius test
- Vehicle rollover test
- Steering performance test

Specification

- Turn radius : R=12, 20, 25, 30, 40, 50, 60, 70, 80, 85m
- Cross slope : 0.5%
- Coefficient of friction : 0.9(ASTM E274 applied)

H.
Wet handling test track

A test track composed of a circular path and a first curve located in the steering pad, which can generate 1mm of water film through the injection nozzle to test the characteristics of the tire on the wet road surface and the steering characteristics.

Applications
- Tire handling characteristic test
- Steering characteristic evaluation test
- Steering response test

Specification
- Turn radius : R=30, 50, 60m
- Water film : about 1mm

I.
Hydroplaning(straight, curve) track

It is a test track that can test the stability and braking power through high speed running on the road surface with water film. It consists of a straight line and a curved line, and the spraying nozzle installed at regular intervals can maintain the water film of about 8mm for about 40 to 50minutes.

Applications
- Tire characteristics test
- Tire water film test
- Steering characteristic evaluation test
- Steering response test

Specification
- Straight portion : Length 150m×width 3.5m
- Curved portion : Length 25m×width 6m, Radius of curvature R=100
- Water film : about 8mm
- Duration : about 40 to 50 minutes

J.
Test hills

A test track that can test the performance of the vehicle's climbing ability or holding ability of braking status and the parts related to the shift or braking. The test can be carried out using three different types of ramps depending on the conditions.

Applications
- Hill climbing ability test
- Clutch performance test
- Variable headlight test of vertical ramp operating conditions
- Ramp Parking brake performance test

Specification
- Slope : 12%, 20%, 30%

About
Test & Evaluation Division

The Test & Evaluation Division provides the best test evaluation service to the customers based on the best technology and trust in Advanced Driver Assistance System (ADAS), Vehicle Dynamics(Ride and Handling, Steering), Braking, NVH, Road Load Data and Durability, Emission part.
In addition, We are striving to support SMEs in securing their technological capabilities through the development of evaluation methods and testing and evaluation solutions such as equipment training.

Steering Robot System

Usage purpose Steering input test under the same conditions

Specifications

Steering Robot(SR60)
- Motor type : Brushless Type
- Maximum torque : 70Nm or more
- Maximum speed : 1,800 deg/s or more
- Angular resolution : ≤ 0.05 deg, Angle accuracy: ≤ 0.3 deg
- Torque Sensor Type & Performance
  - Strain Gauge Type, ±125Nm(Nominal) or more

Brake & Acceleration Robot System

Usage purpose Brake & Acceleration test under the same conditions

Specifications

Braking Pedal Robot BR1000
- Maximum load : 1,400N or more
- Maximum operating speed : 800mm/s or more, maximum stroke : 140mm or more
- Load cell for pedal pressure measurement
  - Type : Strain Gauge Type Load Cell, Load Capacity : 2,000 N (FSO) or more

Acceleration Pedal Robot
- Maximum stroke : 120mm or more, Maximum operating speed : 300mm/s or more
- Maximum torque : 150N or more (70mm), Encoder accuracy : 0.001 deg or more

Lane Mark Detection & Analysis System

Usage purpose Analysis of System for Lane Detection and Departure

Specifications

20Hz Glonass and RTK System 2ea
- Velocity : Accuracy ≤ 0.1㎞/h, Resolution ≤ 0.01㎞/h
- Distance : Accuracy ≤ 50cm/km, Resolution ≤ 1cm
- Absolute Positioning : Accuracy ≤ 2cm

DGPS Base-Station, Video Data Logger(4Camera) 1set
- Correction Method : RTCM and RTCA
- Receive Distance(Open Environment) ≥ Radius 2km
- GPS Update Rate ≥ 20Hz
- Resolution ≥ 720×480, 30FPS

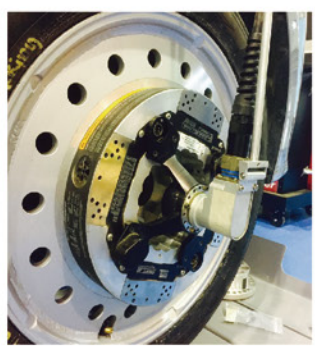
Analysis Software
- Analysis and evaluation of LDWS, FVCWS, BSD

Wheel Vector Sensor

Usage purpose Evaluation & Measurement System for Wheel System (Angle, Speed, Camber)

Specifications Wheel vector sensor(AD7852-WPS)

- Measurement range : X ±30° 이상 / Y Unlimited / Z ±180°
- Resolution : X, Y 0.024mm / Z 0.01mm
- Resolution Angle : X, Z 0.0027° / Y 0 to 360°
- Encoder : 17bit / rotation
- Tire rotary encoder : range 0 to 360° / resolution 0.09°
- Maximum tire rotation : 3000 RPM
- Calculation rate : 1kHz
- Measured factors : Displacement x, y, z / Angle around x, y, z axes / Wheel speed / Angle speed
- Low pass filter : 4 dimension butterworth / Selectable from 1, 2, 5, 10, 20, 50, 100, 200, 500 Hz
- Power supply : AC 100 - 240V / DC 12V AC adaptor / DC 12V±10%
- Operating temperature : 5 - 40℃
- Operating humidity : 5 - 90% R.H.



Road Load Data Acquisition & Analysis System

Usage purpose Road Load Data Acquisition for Fatigue and Durability Analysis

Specifications H/W (Somat eDAQ)

- ECOM Module : 3 High speed CAN, GPS Antenna Module : EGPS-5Hz
- EHIL-AO 32ch(ICP Accelerometer)
- EBRG-350-AO 32ch (Strain Gauge Signal Input)
- SMITC 8ch(Thermocouple)

S/W(nCode Version 7.0)

- GlyphWorks Fatigue Pro Package + IMSL Statistics
- DesignLife Virtual Shaker Package + CAE Vibration Fatigue

Driverless Moving Target Vehicle

Usage purpose Autonomous Robot-Based Target Vehicle for ADAS Test

Specifications Guided Soft Target Vehicle 1set
- Max Speed : 72.4kph, Max Acceleration : 0.2g
  Max Deceleration : 0.6g, Max Lateral Acceleration : 0.3g
- HYUNDAI 2012 SONATA Body Shape
- Car body reassembly time after crash : 10 to 15 minutes
- Remote Control Range : 1.0km

Euro NCAP Vehicle Target

Usage purpose Euro NCAP Vehicle Target for AEB System Test

Specifications Euro NCAP Target
- Balloon, Car Radar absorbent foam
- VW cover, ECE104 standard reflective material
- Tray / Standing Frame
- Bumper Element, RADAR reflective component
- 12v electric pump

NVH Evaluation System

Usage purpose Vehicle NVH(Noise, Vibration, Harshness) Test

Specifications Pass-by Noise 16ch
- 16ch V/ICP/TEDS Input Module, Telemetry System

On-Road NVH 16ch
- 40ch V/ICP/Charge Input Module

Analysis software
- Exterior Pass By Noise Testing, Signature Testing, Structural Testing, Modal Testing, Transfer Path Analysis, Sound Quality(Binaural Headset)

Rollover Test System

Usage purpose Rollover Test, FMVSS126 Test

Specifications

Outriggers & Height Sensor Package
- Outrigger NHTSA Standard Type : 2,725kg
- Height Sensor HF-500C X 10ea
- 8 wheel height & 2 body height sensors
- Measuring Range : 125~625mm
- Resolution : 0.2mm

Active Safety System Testing Equipment

Usage purpose Evaluation & Analysis for Vehicle Dynamic Characteristic and Active Safety System

Specifications

Wheel Speed Sensor 2ea
- Permissible rotational speed : 6,000/min

Steering Wheel Sensor 1ea
- Angle resolution : 0.1°, Maximum steering speed : 1,000°/sec

Pedal Load Cell 1ea
- Measurement Range : 1,000N

Camber Angle Measurement System 2ea

WFT 30A 4ea

Inertial & DGPS Measurement System

Usage purpose Vehicle Dynamic Characteristics for ADAS Test (with Position Accuracy : 2cm)

Specifications

GPS/INS(RT 3002) 2ea, DGPS 1ea, RT-Range 2ea, RT-Range Survey Trolley 1ea
- Velocity Accuracy : 0.05km/h RMS
- Roll, Pitch 0.03°, Heading 0.1°, Slip Angel 0.15°

Driverless Base-Station System

Rotating Laser Scanner System(ibeo LUX 2010) 2ea

Analysis Software
- Analysis and evaluation of ADAS(LDWS, ACC, BSD, LCA, etc.)

48inch 4x4 Chassis Dynamometer & Emission Test System

Usage purpose ADAS Performance Evaluation Test in the Integrated Simulation Environment and Fuel Efficiency Test

Specifications

Chassis Dynamometer 1set
- Max Speed : 260km/h
- Tolerance of Speed Measurement ≤ 0.02km/h
- Roll Diameter : 48inch, 4X4

Emission Test System 1set
- Gasoline & Diesel Emission Test System
- Fuel Efficiency Test System

Integrated Simulation Environment Software 1set

Ride & Handling analysis software

Usage purpose Analysis for Ride & Handling Test

Specifications

Handling Module
- Step steer(ISO 7401), Steady-state turning(ISO 4138), Frequency response(ISO 8726), Pulse(ISO 7401), Continuos sine(ISO 7401)

Stability Module
- Fishhook(NHTSA), Dwell sine(FMVSS-126), Lane change(ISO 3888-1/2), Power-off(ISO 9816), Brake in a turn(ISO 7975), Cross-wind(ISO 12021-1), Free Steer(ISO 17288-1)

Steering Module
- On centre weave(ISO 13674-1), On centre transition(ISO 13674-2)
- Parking steering effort, Return ability

Electro Dynamic Vibration Test System

Usage purpose Durability Test in the Combined Environment (Temperature, Humidity, Vibration)

Specifications

Sine Force : 16,000kgf, Random Force : 16,000kgf, Shock Force : 48,000kgf
Max. Displacement : 76mm, Max. Acceleration : 100g, Max. Velocity : 2.0m/s
Frequency Range : 1 ~ 2,000 Hz
Head Expander Size(Table) : 1,000 X 1,000 mm(circle)
Environmental Chamber
- Internal Size : 1,300 X 1,300 X 1,500 mm
- Temperature Range : -50℃ to + 160℃(5.0℃/min)
- Humidity Range : 20% ~ 98% RH(5.0℃/min)

3-Axis Simultaneous Vibration Test System

Usage purpose 3-Axis(X,Y,Z)Simultaneous Durability Test in the Combined Environment(Temperature, Humidity, Vibration)

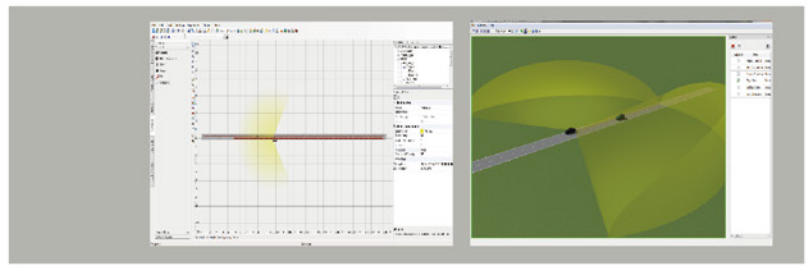
Specifications

Sine Force : 5,000kgf, Random Force : 5,000kgf
Max. Displacement : 40mm, Max. Acceleration : 10g peaK(At no load),
Max. Velocity : 1.6m/s
Frequency Range : 5 ~ 1,000Hz(Sine), 5 ~ 2,000Hz(Random)
Head Expander Size(Table) : 600 X 600 mm(circle)
Environmental Chamber
- Internal Size : 800 X 800 X 900 mm
- Temperature Range : -50℃ to +160℃(5.0℃/min)
- Humidity Range : 20% ~ 98% RH(5.0℃/min)

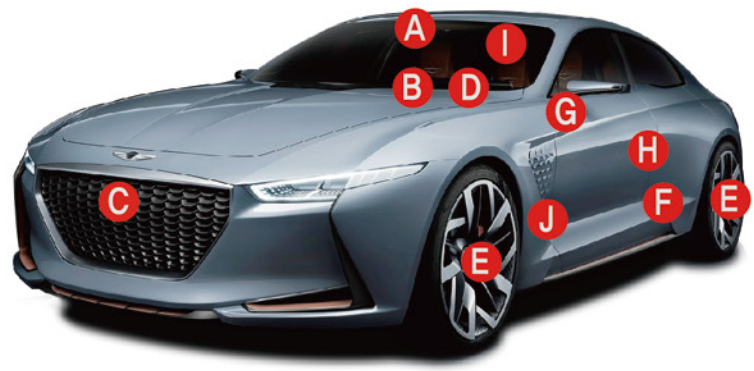
Test and evaluation work of the ADAS vehicle

We evaluate ADAS products(LDWS / LKAS, BSD, LCA, AEB, FCW, CTA, TJA, SCC, HDA, etc.) and conduct conformity assessment of EuroNCAP regulations(LD-WS/LKAS, AEB).

Prescan SW



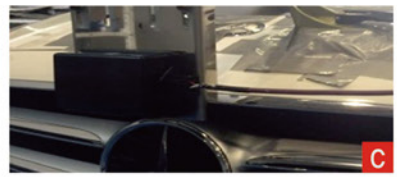
Measurement



A. Lane recognition Sensor
B. Parallel NTS, Steering Robot(SR60)
C. RADAR SENSOR
D. Acceleration Sensor
E. Brake hydraulic Sensor(FR,FL,RR,RL)
F. DAQ(SIRIUS)
G. 4 CAMERA
H. Gyro Sensor
I. Microphone
J. Acceleration & Deceleration pedal robot

A. Lane recognition Sensor
B. Parallel NTS, Steering Robot (SR60)

C. RADAR SENSOR
D. Acceleration Sensor

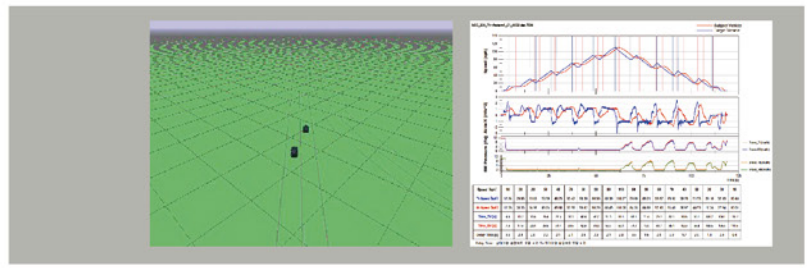


E. Brake hydraulic Sensor (FR,FL,RR,RL)
F. DAQ(SIRIUS)

G. 4 CAMERA
H. Gyro Sensor

I. Microphone
J. Acceleration & Deceleration pedal robot

DIAdem SW / Dynasoft SW



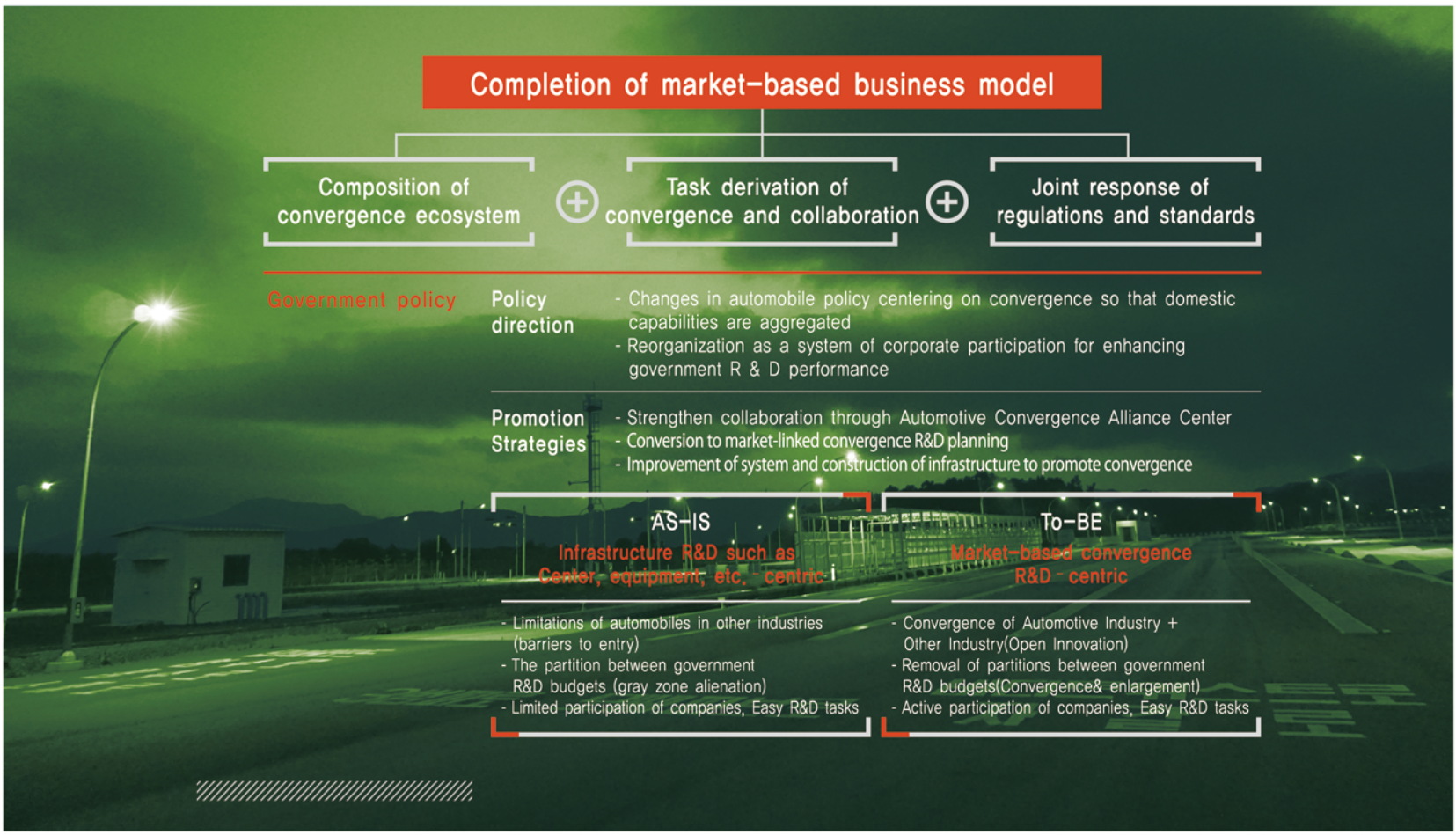
About
Automotive Convergence Alliance Center

The Automotive Convergence Alliance Center aims to exchange information on industry, university, research Institute and government in order to find voluntary cooperation projects (Business Model) between automobile and other industries in response to the paradigm shift of the future automobile market.

Goals and Strategies

"Changes in Automobile Industry Policy toward
convergence of Automotive Industry + Other Industry "

– Management and Operation of Automotive Convergence Alliance Center



Strategies for deriving business models

Finding business models based on OEM demand

Finding business models based on supplier ideas

Recruiting participating companies for OEM demand and forming working group

Strategies for deriving business models

Building review and collaboration relationships of OEM about supplier ideas

Completion of market-based business model

Organization and participation status

Role of the Automotive Convergence Alliance Center

Derivation : Composition of convergence ecosystem

- Automobile industry + other industry = Setting the goal of (Electronic equipment Division, Eco-friendly Division, Emotion Division, Legal System Division)

Planning : Task planning of convergence and collaboration

- Planning business model of convergence of Automobile industry + other industry
- Structure of member, grasp of additional necessary technology(R&D planning connection)

Commercialization : Joint response of regulations and standards

- Researching and resolving difficulties such as laws, regulations, and standardization
- Promotion of commercialization

Construction of Advanced Driver Assistance System(ADAS) Platform

It is aimed at establishing infrastructure to support technology development and product improvement of small and medium enterprises related to ADAS, and to create ecosystem for industrial upbringing.

Vision

"Preemption of global market through establishment of future automobile industry support system"

Completion of dedicated platform for strengthening global competitiveness of ADAS related parts

Business overview

Project Name : Construction of Advanced Driver Assistance System(ADAS) Platform
Project period : April 1, 2017 to December 31, 2020
Organizer : KIAPI
Participants : Gyeongbuk hybrid technology institute

Challenge task

ADAS Platform construction

Building dedicated test bed for ADAS test
- Test of conformity of laws and regulations (Enhanced Euro NCAP)
- Building ADAS test bed in the test center

Operation of industrial ecosystem creation program
- Holding technical seminar on ADAS and future automobile
- Construction of ADAS Industrial Network (Technology Exchange Meeting)
- Activation support(Operation of Working Group)

Building a test Research Center
- Private space for business execution and operation(2nd floor)

Construction of equipment for ADAS evaluation
- Equipment for vehicle test(6 kinds)

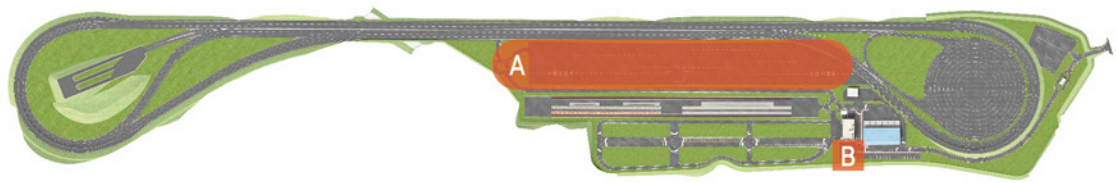
Weighed strategy

Strengthening technology and market competitiveness and preempting the market (ADAS/autonomous driving)

Responding to Global Market Regulatory Issues ⊕ Responding to Social, Economic and Technical Issues ⊕ Contribution of New automotive industry ecosystem

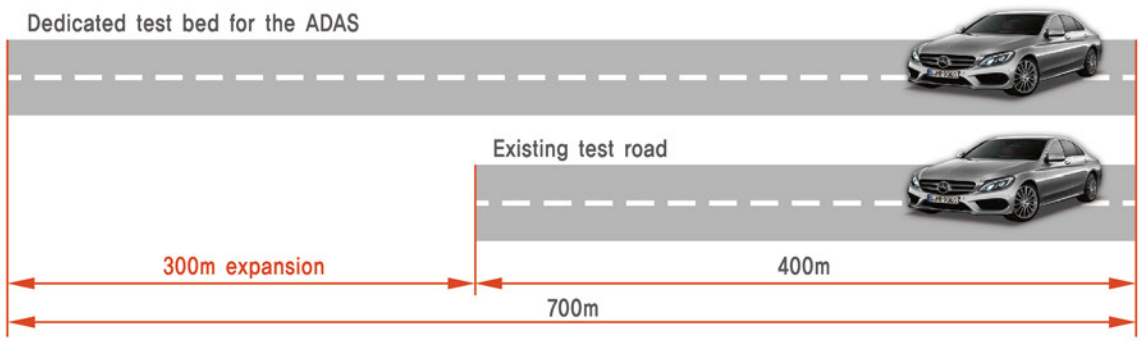
ADAS test bed

Construction of ADAS dedicated test bed for enhanced Euro NCAP and autonomous vehicle performance evaluation



A. Dedicated test bed for the ADAS

B. Test Research Center

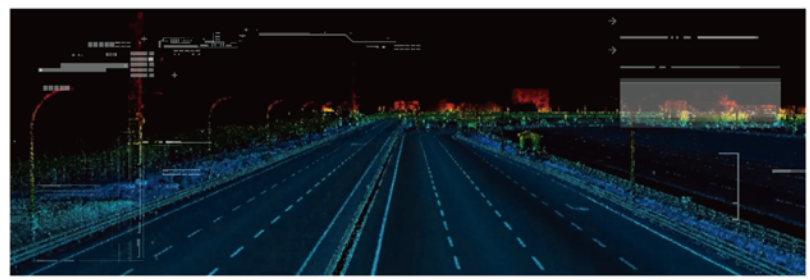


Expansion of the ADAS test due to the establishment of dedicated test bed

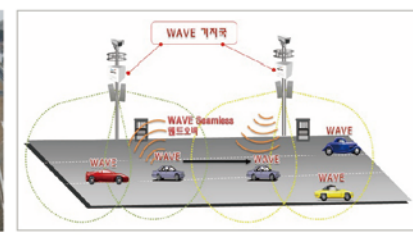
Test Items	Multipurpose test track	Dedicated test bed for the ADAS	Related regulations
Stop target mode of Autonomous Emergency Braking(AEB)	Possible	Possible	Euro NCAP
Moving target mode of Autonomous Emergency Braking(AEB)	Target speed up to 40kph	Target speed up to 80kph (40kph increase in speed)	Euro NCAP : 80kph
Front braking target mode of Autonomous Emergency Braking(AEB)	Impossible	Possible	Euro NCAP
Blind Spot Detection(BSD)	Target speed up to 50kph	Target speed up to 80kph (30kph increase in speed)	ISO 17387
Smart Cruise Control(SCC)	Following the preceding vehicle speed	Speed pattern, third vehicle In/Out pattern (additional testing available)	Following the preceding vehicle speed
Lane Keeping Assist System(LKAS)	KNCAP, Euro NCAP, NHTSAPossible response of the 2017 Legal test	Enhanced 2018 Euro NCAP (additional responding to new protocol lanes)	KNCAP, Euro NCAP, NHTSA

Possibility of existing facility connection test

Precision map of driving test ground(digital map)



Test intersection

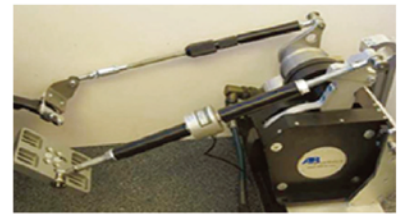


WAVE communication network

Construction of ADAS evaluation equipment

Establishment of compliance test equipment for the purpose of responding to Euro NCAP, NHTSA, and Kncap

Steering Robot System
Brake & Acceleration Robot System

Guided Soft Target(GST)


Soft Pedestrian & Cyclist Target


Technical exchange meeting and activation support

[Daegu International Future Auto Expo] Mobilizing the relevant experts, such as competencies industry, academia through the hosting of international-scale expositions
ADAS Consultative Body : Sharing technology trends and development directions and responding to global issues
- Forum : Invited lectures and seminars by experts from Korea and abroad
- Exhibition : ADAS, Future Automobiles and Parts Exhibition, Business Consulting, etc.

Providing information related to ADAS(patent, technology trends)
- Providing analysis of patent analysis and technology roadmap for promising technologies related to ADAS

ADAS test evaluation accreditation
- ①AEB(C2C) ②AEB(VRU) ③CTA ④LDWS ⑤LKAS ⑥BSD ⑦CLA ⑧SCC ⑨TJA

Establishment of ADAS development activation system
- Operation of Working Group(Automobile Convergence Alliance), participation in exhibition

About National Project

Development and demonstration of smart car-talk service model

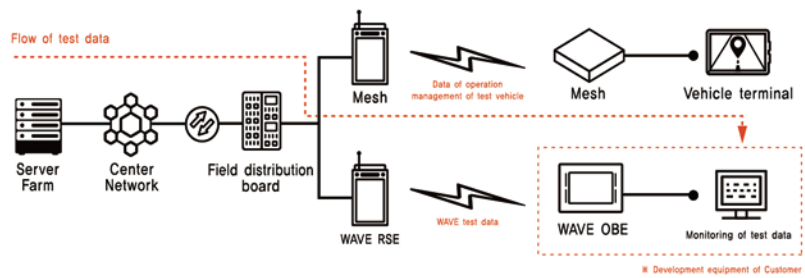
It is a project to support the demonstration support and test analysis of services(safe driving, driving convenience, vehicle management, infotainment) using the infrastructure of the drive proving ground(equipment, PG)

Construction equipment

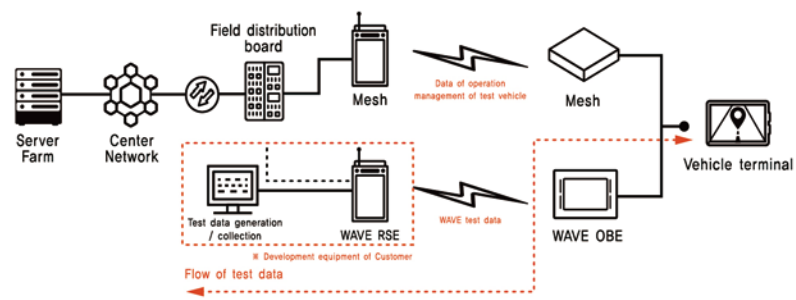
Measurement and analysis system of WAVE communication V2X vehicle performance

1. Performance test of WAVE device
   - implementation of the communication performance testing of RSU/OBU devices in high-speed driving state
   - Vehicle based PER test, RTT test, RSSI measurement
   - Monitoring real-time vehicle location and measuring packet reception sensitivity (communication radius)
   - Display of test results by RSSI by distance, RSSI by speed, analysis of maximum commu-nication radius, analysis of latency
2. Performance Test of Autonomous System
   - Performance measurement by verifying the requirements of the autonomous system (latency, server response speed, etc.)

Consistency test of Customer's OBE WAVE communication



Consistency test of Customer's RSE WAVE communication



About National Project

Construction of precise map for autonomous car

Precise map for autonomous car Supports the upbringing of new industry such as autonomous vehicle technology, unmanned mobile object, VR / AR with 3-dimensional digital map expressing lane information, regulation and safety information and various road facilities.

Implementation of a pilot project for Constructing of precise map for autonomous car in Daegu drive proving ground

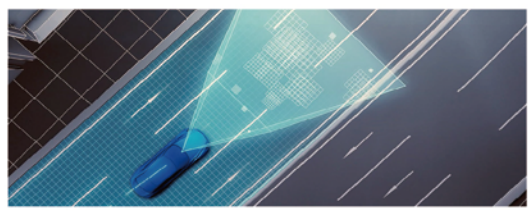
Korea Land and Geospatial InformatiX Corporation

Ministry of Trade, Industry and Energy

Construction of precise electronic map using Daegu drive proving ground

Establishment and evaluation system of public standard DB to support development of recognition technology of intelligent vehicle

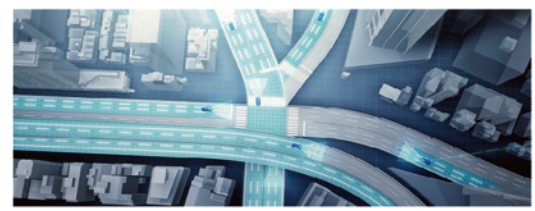
- Development of evaluation method of recognition technology /DB construction
- Vehicle based PER test, RTT test, RSSI measurement
- Monitoring real-time vehicle location and measuring packet reception sensitivity (communication radius)
- Display of test results by RSSI by distance, RSSI by speed, analysis of maximum communication radius, analysis of latency



Designation and activation of Autonomous demonstration complex in Daegu

Promoting the development of systems, infrastructure and transport information systems required for autonomous driving safety operations

- 3D digital map representation including lane, regulation, safety, facilities
- 25cm accuracy of road related information
- Providing information that meets the complex trend of maps, sensors, etc.
- Supporting and expanding autonomous vehicle technology development



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Korea Intelligent Automotive Parts Promotion Institute

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By highway

Hyeonpung IC(Guji direction) 〉 Gukgasandanbuk-ro(Move 2.29km) 〉 Turn left into National Industrial Complex 〉 Gukgasandan-daero(Move 1.75m and turn right) 〉 Gukgasandan-daero 39 gil(After 743m, turn left) 〉 Gukgasandanseo-ro 40 gil(Move 667m) 〉 Entrance of Daegu drive proving ground(Main building and parking lot after going straight 500m after passing the main gate)

지능형자동차부품진흥원

KOREA INTELLIGENT AUTOMOTIVE PART PROMOTION INSTITUTE

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