



Korea-EU Horizon Europe Researchers Networking Forum on Energy & Advanced Mobility

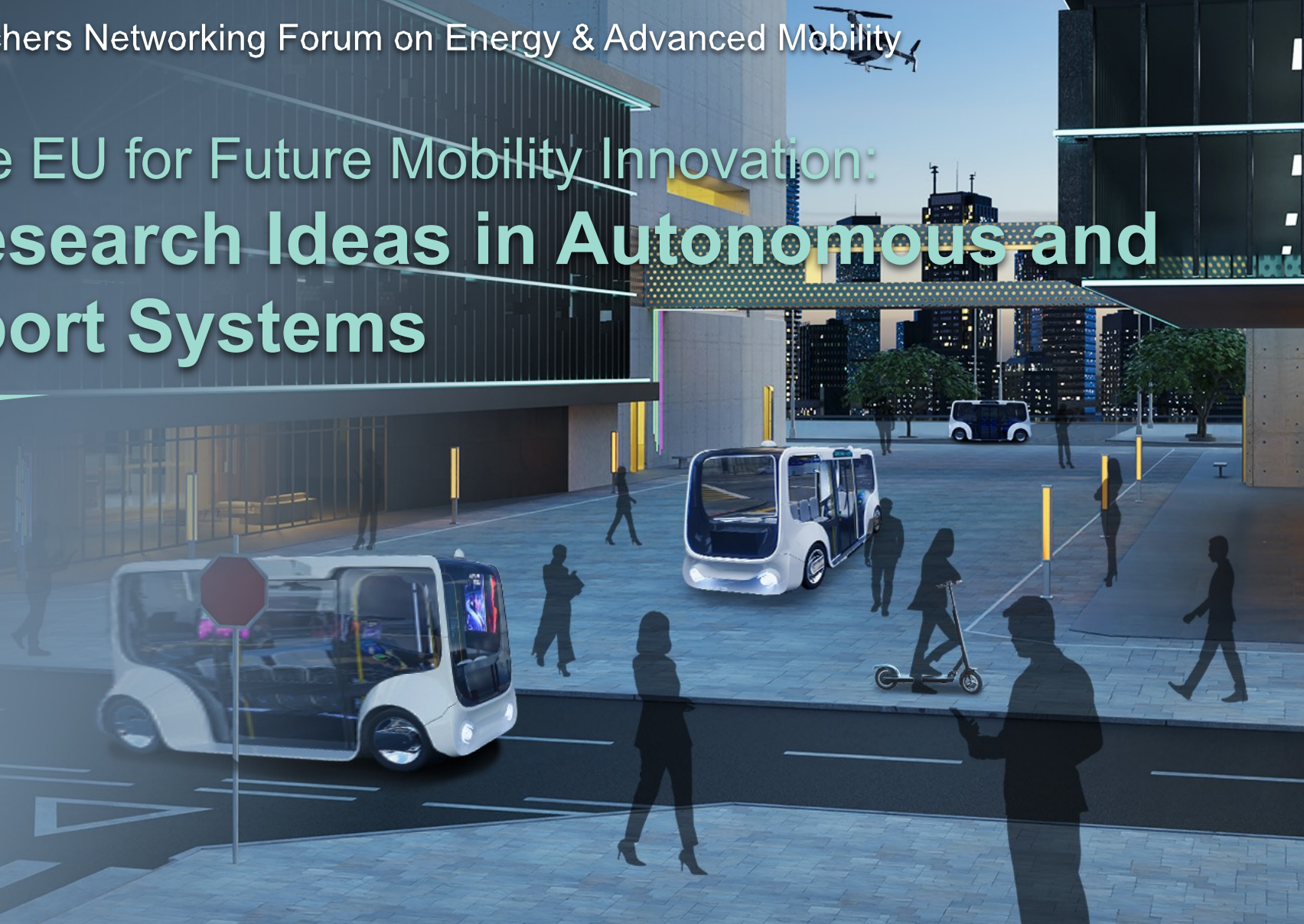
Bridging Korea and the EU for Future Mobility Innovation: Collaborative Research Ideas in Autonomous and AI-driven Transport Systems

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Dept. of Transportation System ENG

AJOU UNIVERSITY

MOVE
a - mobility operation design, validation, and enhancement lab



An architectural rendering of a modern, multi-story building at night. The building features large glass windows and balconies, some of which are illuminated from within. In the foreground, there is a large, red, abstract sculpture. A small, white, futuristic car is parked on a green patch of grass. Several people are walking around the area. The background is dark, with a network of white lines and dots, suggesting a digital or technological theme.

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Others & Contact Information

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Fellowship (2015-2017)
 and Member (2015-)



Research Areas

AV Controls in Traffic Flow
 A.V.–Infra. Sensor Data Fusion
 A.I./Heuristic-based Mobility Operation Optimization
 A.I. Mobility Data Analytics

Projects in Progress:

Future Traffic Control Center Development
 A.I./Big Data-driven Road/Link Safety Assessment
 Automated Police Patrol Vehicle R&D
 Automated Service Utility Vehicle R&D
 LV 4. AV Testbed and Test Procedure R&D

AUG 2013

Ph.D. in Civil Eng.



AUG 2013 – SEP 2014

Post-doc & Lecturer



OCT 2014 – SEP 2016

Post-doc & Lecturer



OCT 2016 – AUG 2020

Associate Research Fellow



SEP 2020 – Present

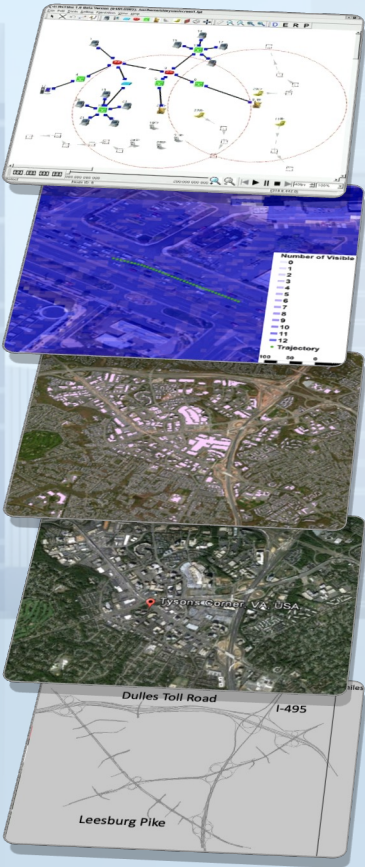
Professor



Development of a Surrogate Safety Assessment Framework Incorporating Traffic Simulator, Vehicle Dynamics, Driver Warning, GPS/INU, and V2V/V2I

Local Dynamic Map

(e.g. CityGML, Local Dynamic Map)



V2X comm. sim.

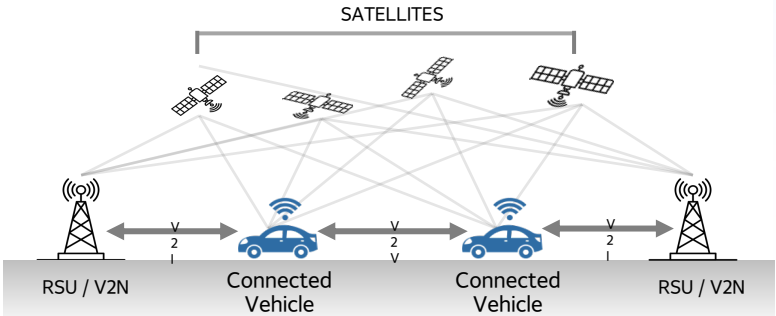
Satellite visibility map

Height map (z)

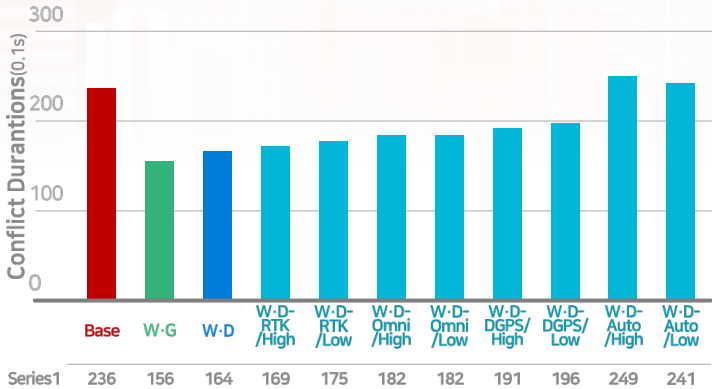
Map (x&y)

Micro. traffic sim.

“Connected Vehicles”



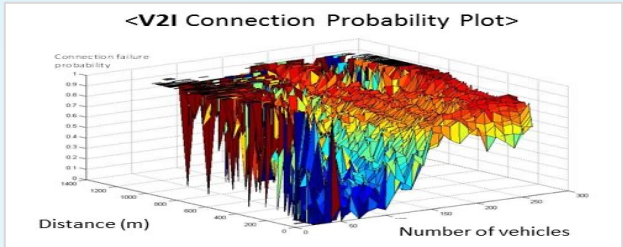
The safety performance of ADAS and CV is correlated with the performance of V2X comm. and GNSS, and may even be worse than human driving if the performance of V2X and GNSS falls below a threshold



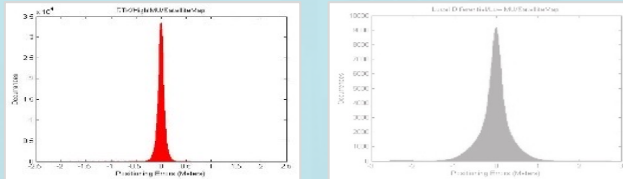
Safety Assessment Results

Performance Evaluation Modeling for Comm. & GPS

Comm. Sim.



Positioning Error Sim.



Traffic Sim.



Jaehyun (Jason) So

Ongoing Projects (Research & Development) | Roles & Capabilities | Key Partners

R&D Projects	Roles of AJOU/MOVELAB	Key Partners
Future Traffic Control Center Development	Establishment of the concept of Future Traffic Control, development of use cases, and <u>development of AI-based algorithms for major use cases</u>	 Korea Expressway Corporation
A.I./Big Data-driven Road/Link Safety Warning Algorithm	Road-link-level <u>safety assessment and indexing algorithm development utilizing big-data-driven AI</u>	
Automated Police Patrol Vehicle R&D	- Impact analysis by event type using <u>traffic detection infrastructure data (AI-based classification and clustering)</u> <u>AI-based Route Generation & Optimization for</u> Automated Police Car Patrol and Dispatch	 
Automated Service Utility Vehicle R&D	<u>Functional validation</u> of Automated Service Utility Vehicles (ASUVs) in <u>virtual environments (simulation) and real-world testbeds</u> - Development of <u>de-identification algorithms</u> for ASUV sensor data	  
LV 4. AV Testbed and Test Procedure R&D	<u>Design of physical and digital infrastructure</u> components at K-City (National AV Testbed in Korea) for Level 4 autonomous vehicle testing - Development of <u>test scenarios and evaluation procedures</u> for Level 4 autonomous vehicles	 
...	...	...

Showcasing Research Works at TRB 2026

7 papers to be presented - come and join the discussion at TRB 2026.

1	From Crash Data to Policy Action: A Large Language Model Approach to Enforcement Decision Support	1	Real-World Data-Driven Identification and Simulation-Based Validation of High-Risk Takeover Scenarios in Urban Autonomous Driving
2		2	
3		3	
4	Haneul Park	4	Eunho Lee
5	Ph.D. course	5	Graduate Researcher
6	Department (Transportation Engineering Program) of Data/Network/AI Convergence	6	Transportation Engineering
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11		11	ORCID: 0009-0000-0000-0000
12	Constantinos Antoniou	12	
13	Professor	13	Sungeun Cho
14	Chair of Transportation Engineering	14	Graduate Researcher
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20	Associate professor	20	
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24		24	
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31		31	
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33	Assistant Professor	33	
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36	Email: jso@ajou.ac.kr	36	
37	ORCID ID: 0000-0001-9344-2183	37	
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39	Word Count: 2465 words	39	
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41		41	
42	Submitted [Submission Date]	42	
43	*Corresponding Author	43	
44		44	
1	Impact Zone Analysis in Traffic Congestion Scenarios using Unsupervised Anomaly Detection	1	LiDAR on the Move: Extracting Lane Level Traffic Indicators from Autonomous Vehicles
2		2	
3		3	
4	Sungmin Yoo	4	Sungeun Cho
5	Graduate Researcher	5	Graduate Researcher
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1	CONTEXTUAL MODELING OF REAL-WORLD DRIVING BEHAVIOR WITH LARGE LANGUAGE MODELS AND REALISTIC REPRODUCTION IN TRAFFIC SIMULATION	1	Multi-Modal Trajectory Prediction of Child Pedestrians Using a Unified Transformer Model
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Reflections from TUM and European Research Collaboration

Post-doc researcher and lecturer at **TECHNICAL UNIVERSITY OF MUNICH, Germany (2014-2016)**

- **Chair of Traffic Engineering and Control** (formerly Prof. Dr.-Ing. Fritz Busch, currently Prof. Dr.-Ing. Klaus Bogenberger)
- Responsibility for International and European Research on Automated/Connected Vehicles and Intelligent Transport Systems
- Lecturers: Traffic Control and Traffic Flow Simulations



Alexander von Humboldt Foundation
Fellowship (2015-2017) and Member (2015-)



- Research Title:
Advanced Road Safety Simulation Test-bed for the Next-generation Driver Assistance Systems
- 3 years of fellowship at the host university or research institution
- Collaboration opportunity with other European research institutes

Reflections from TUM and European Research Collaboration

Horizon 2020 Consortiums and EuroTech Universities Activities



- 3 tries for Horizon 2020
- DYNASPACE for Big Data integration and decision-making algorithm
- TADI for facilitating smooth automated driving based on reliable infra. Tech.
- ASSIST for advanced virtual AV test and validation platform
- Eurotech Activities with DTU, TU/e, EPFL as a TUM affiliate
- Engaged in the full project lifecycle — from ideation and project “cooking,” to consortium formation and actual proposal preparation

Title (tentative): **DYNASPACE**
- A Dynamic Shared-
Information Space of Road
Usage and Decision Making

H2020 call MG 3.6 - *Safe and connected automation in road transport*, by developing an integrated temporal-spatial shared-information space

Johannes Kepler University of Linz	AT
Technische Universität München	DE
Eindhoven University of Technology	NL
Sociedad Ibérica de Construcciones Eléctricas	ES
Bayerische Motoren Werke AG	DE
Beacon Tech Ltd.	IL

Title (tentative): **TADI - Transport**
Automated Driving Infrastructure
Platform

Horizon 2020 MG-3.4.-2016 –
Transport infrastructure innovation
to increase the transport system
safety at modal and intermodal
level (including nodes and
interchanges)

National Centre for Scientific Research “Demokritos”	Greece
Mobility Insight	Israel
Fundacion Tecnalia Research & Innovation	Spain
Technion-Israel Institute of Technology	Israel
C.G – Smartech LTD	Israel
ATTIKO METRO	Greece
Zeltron S.A. (Vodafone Group)	Greece
Transition Technologies S.A	Poland
Kielce City	Poland
University of the Aegean	Greece
Mobility & Logistics Cluster	Spain
Bilbao City	Spain

ASSIST

Advanced Road Safety Simulation Test-bed for the Next-generation Driver Assistance Systems

Excellence
This research was initiated from the concern that there is no appropriate safety simulation test-bed that implement the state-of-the-art driver assistance systems by considering the potential degradation of detection technologies and various traffic situations while the road automation is being accelerated with the developments of automated vehicles equipped with the emerging detection systems and the advanced safety applications.

HORIZON 2020 - WORK PROGRAMME 2014-2015
Marie Skłodowska-Curie Actions

Call for Marie Skłodowska-Curie Individual Fellowships (IF)
H2020-MSCA-IF-2015

Objective:
The goal of Individual Fellowships is to enhance the creative and innovative potential of experienced researchers wishing to diversify their individual competence in terms of skill acquisition through advanced training, international and intersectoral mobility.

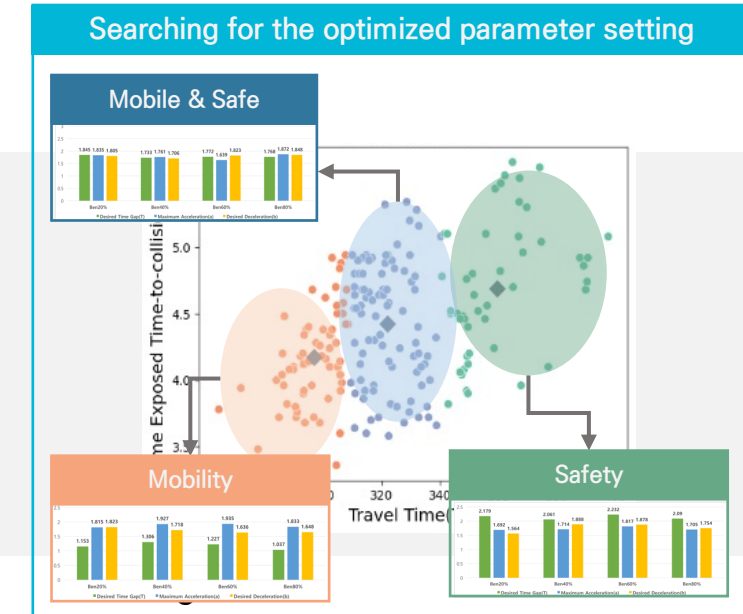
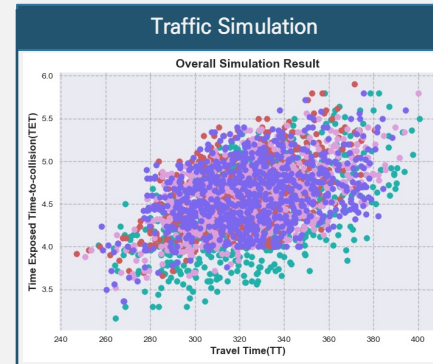
Individual Fellowships provide opportunities to acquire and transfer new knowledge and to work on research in a European context (EU Member States and Associated Countries) or outside Europe. The scheme particularly supports the return and reintegration of researchers from outside Europe who have previously worked here. It also develops or helps to restart the careers of individual researchers that show great potential, considering their experience.



Exploring Optimum AV Controls

AV Driving Parameter Optimization for Mobility and Safety

- Conducting simulations to represent diverse driving scenarios for autonomous vehicles
- Applying AI-based clustering to categorize the results into distinct groups
- Identifying parameter ranges that maximize mobility and safety, as well as the balanced trade-off region



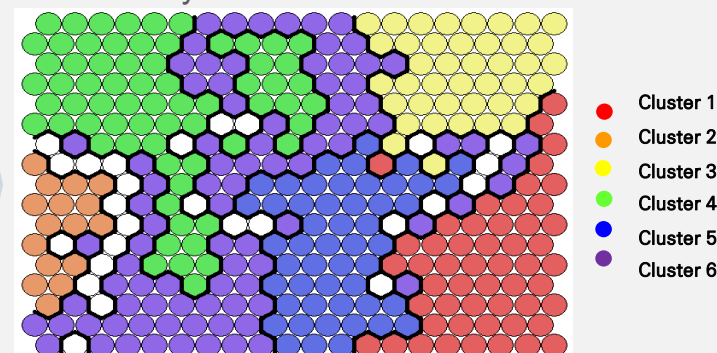
Finding and Learning from AV Sensor Data

- Identifying and detecting adverse road-traffic environments for autonomous vehicles using AV sensor data
- Finding characteristic signatures of adverse conditions affecting autonomous vehicle operation stability

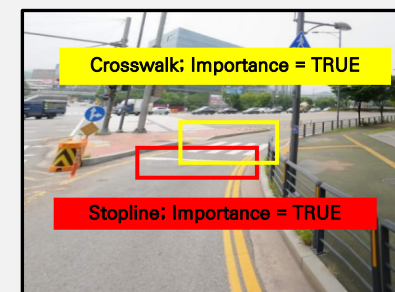
Zero Shuttle Data



Result of Hybrid SOM K-means++ Plot



Finding characteristic signatures of adverse conditions

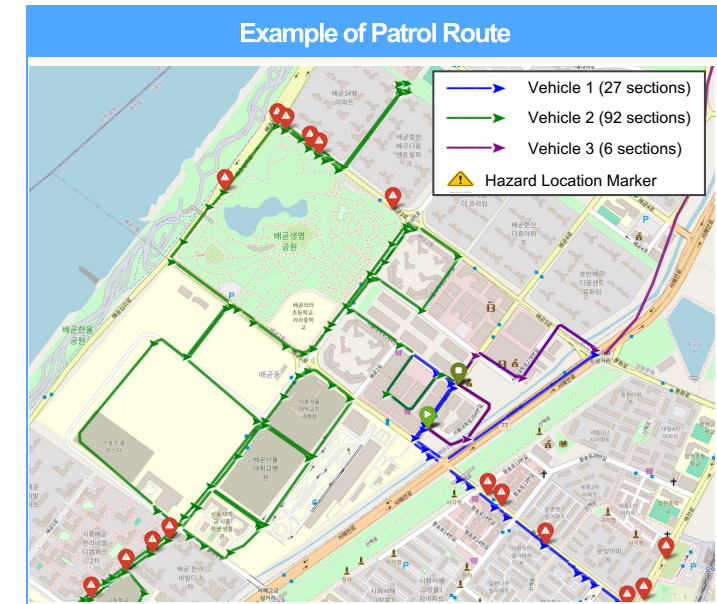
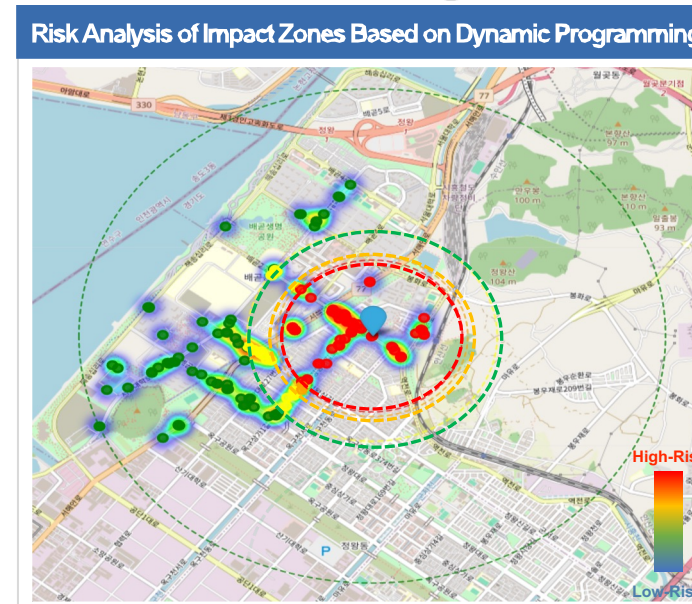
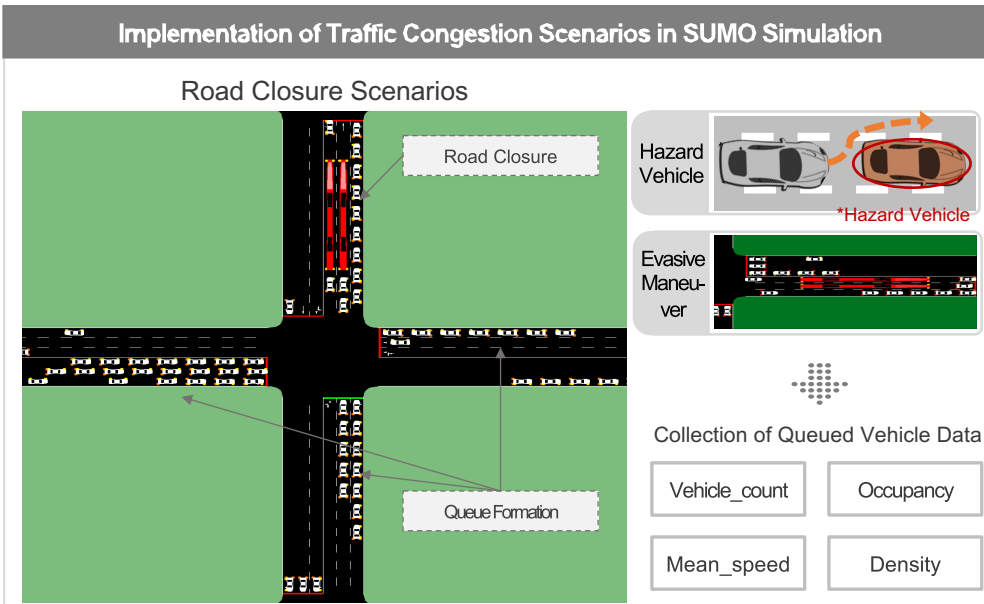


AV Operations (Route Generation and Optimization)

Automated Police Patrol Vehicle



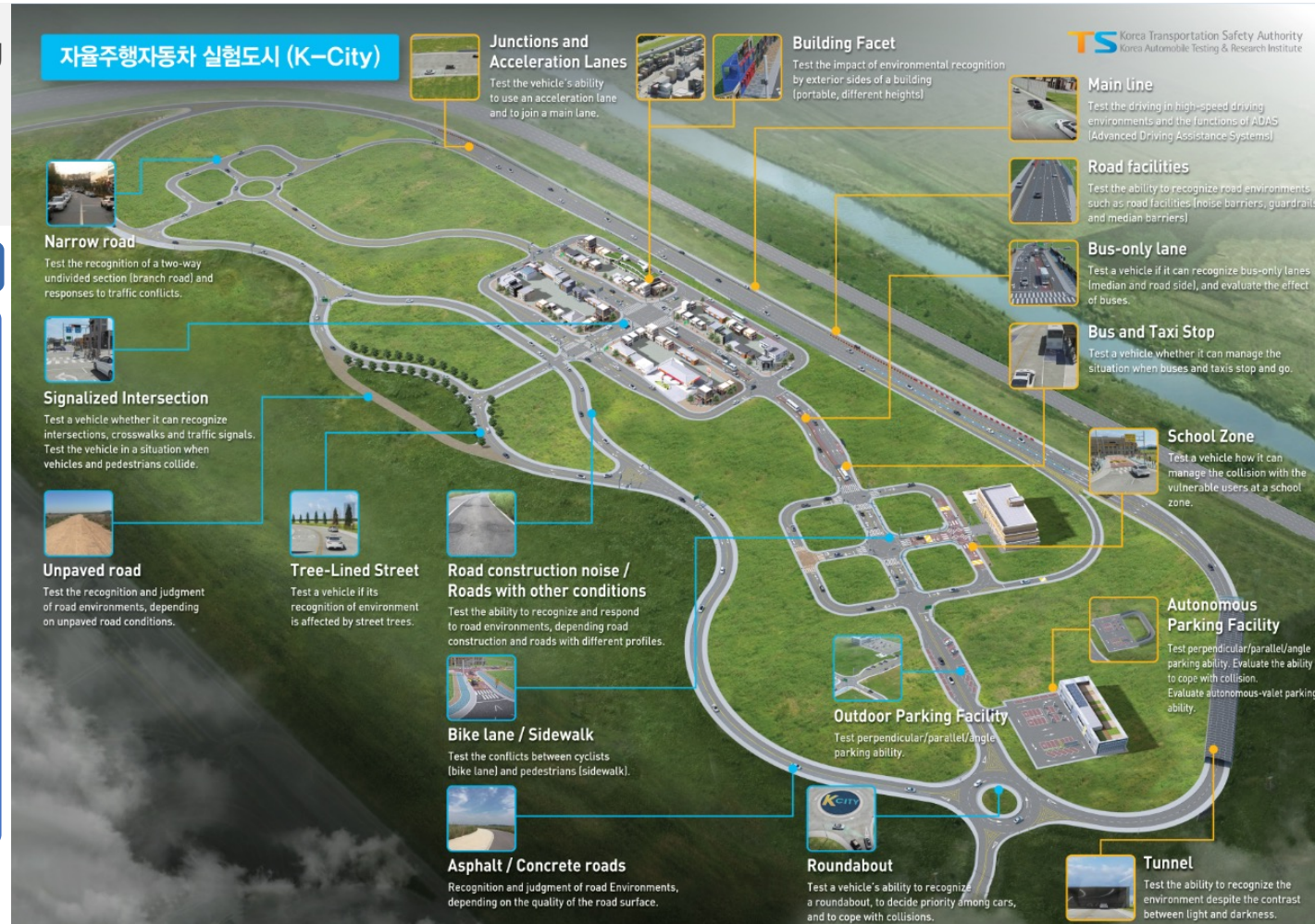
Automated Service Utility Vehicle



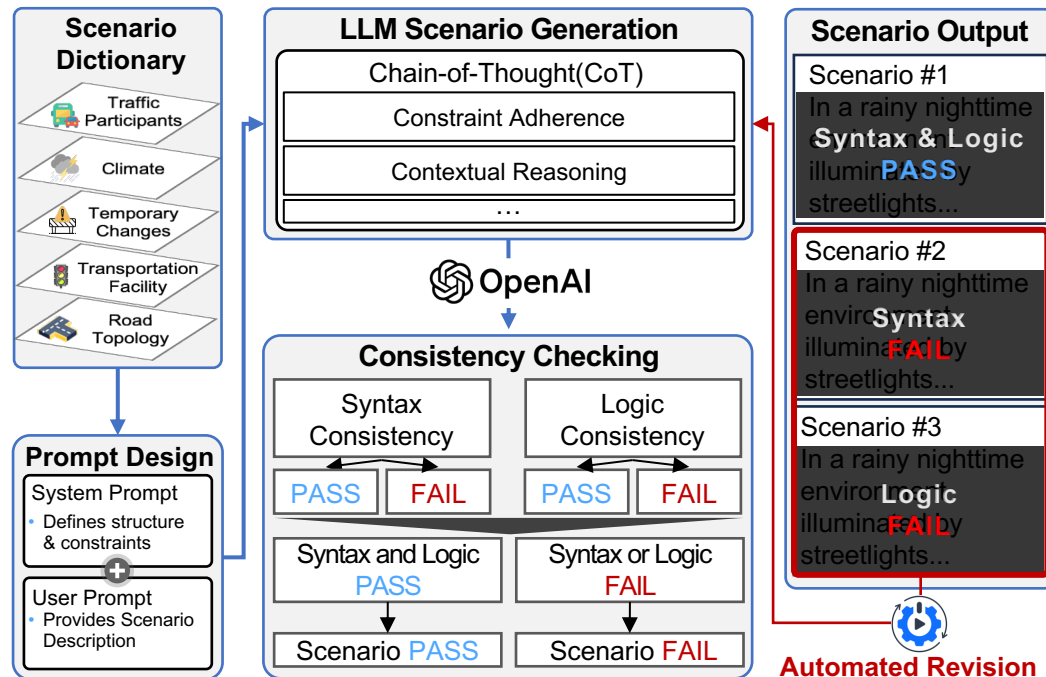
AV Testing and Validation Technologies

“K-CITY” Korea’s National Testbed for Autonomous Vehicle and Digital Infrastructure

- Korea’s national testbed for autonomous driving, replicating real-world road environments for testing and validation
- Developed 27 autonomous, 25 cooperative, and 19 service driving scenarios for testing and evaluation



Hybrid LLM-driven Scenario Generation and Auto-Revision Pipeline



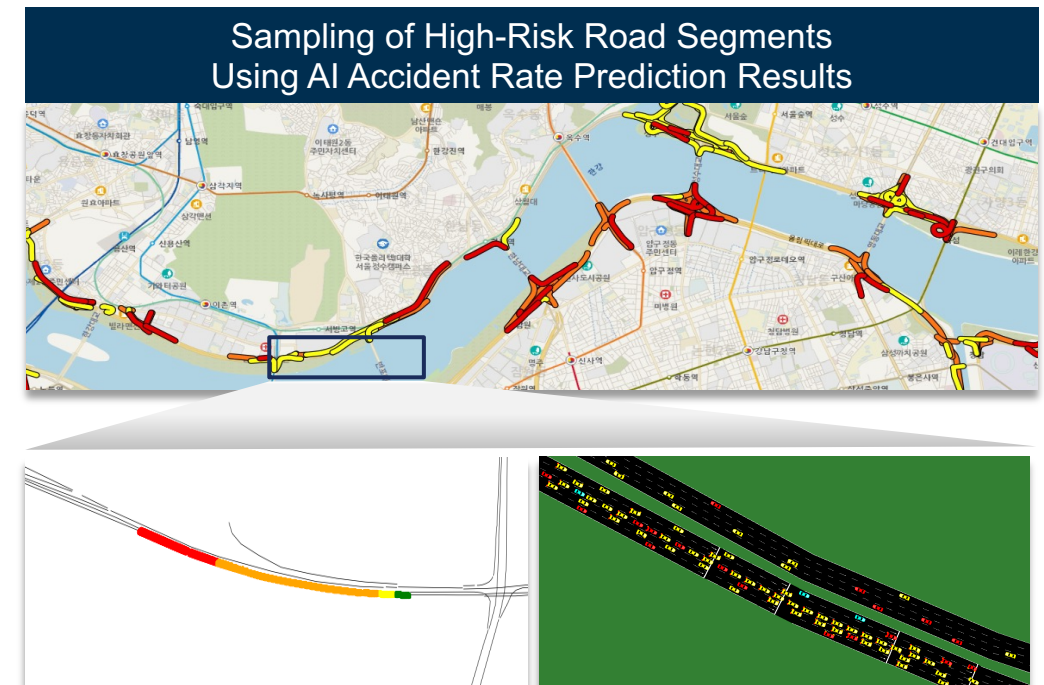
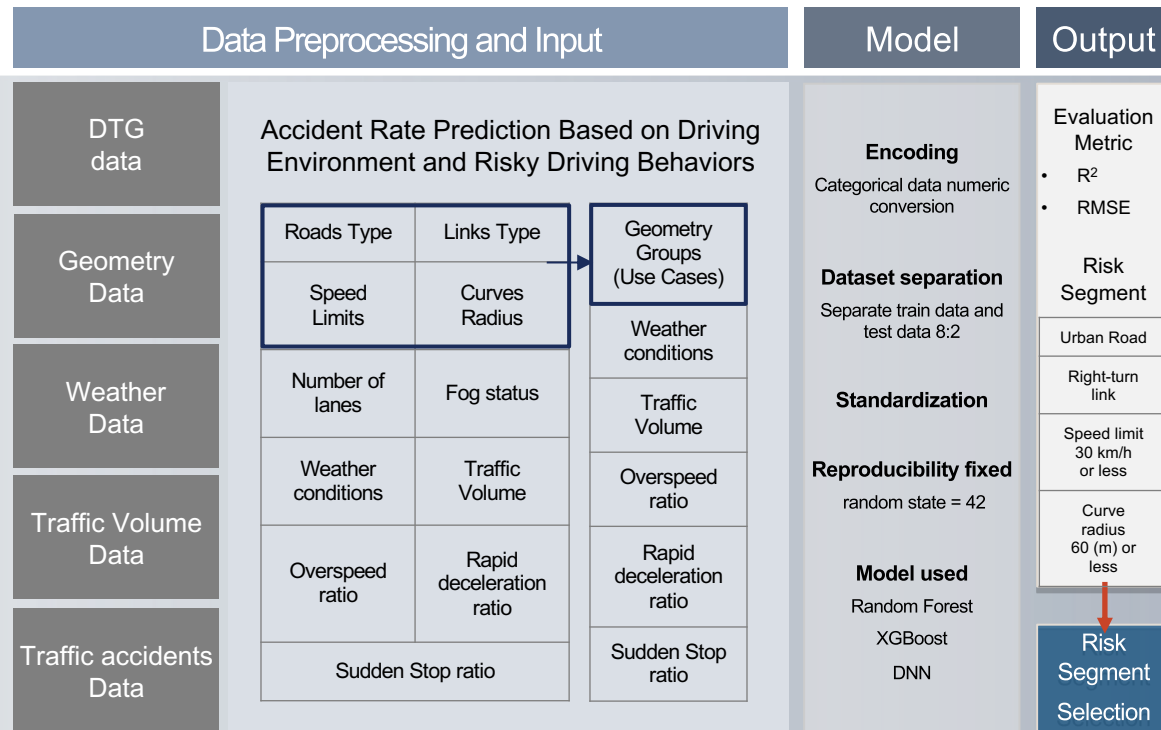
AI-/Big Data-driven Safety Assessment and Warning Solution

AI-/Big Data-driven Safety Assessment and Indexing

- Training AI models using real-world data to identify high-risk road segments and accident factors.
- Assessing risk levels across various road geometries, including sections with traffic flow changes.

Performance Validation via Open Source SIM

- Sampling high-risk road segments based on AI results and building SUMO simulation sites using OSM data.
- Validating extracted indicators using open-source SIM platforms.

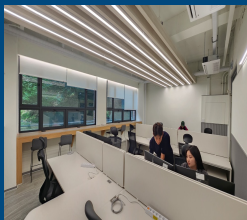


Extracted Indicators: TTC, Lateral Lane Position, Lateral Acceleration, etc.

UNIV. Curriculum Innovation Program: Toward Mobility Engineering with Data, Network, and AI

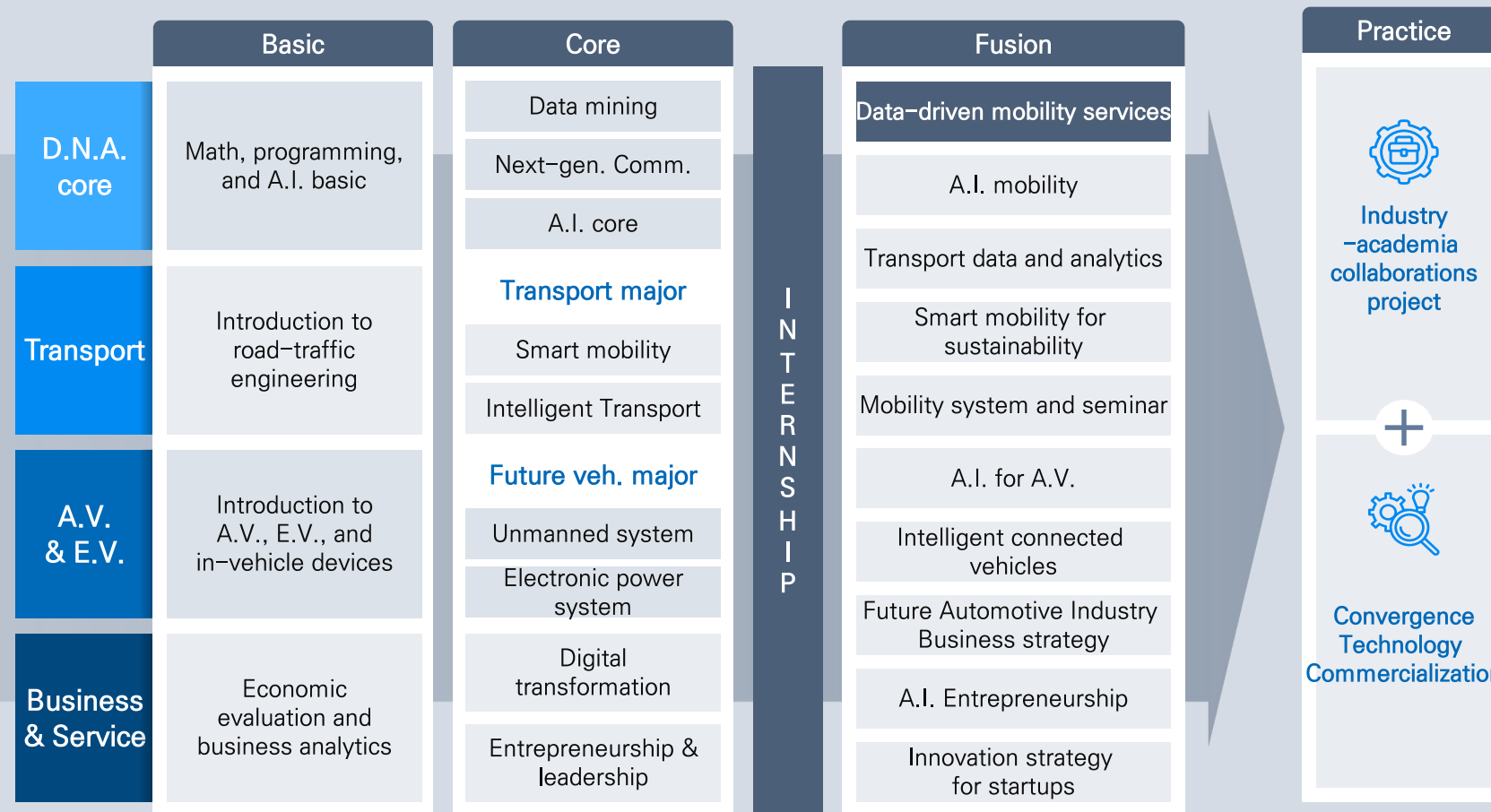
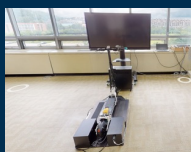
AJOU UNIVERSITY

Department of D.N.A. Convergence
Graduate Program



KAIST

Cho Chun-Shik School of Mobility
Graduate Program

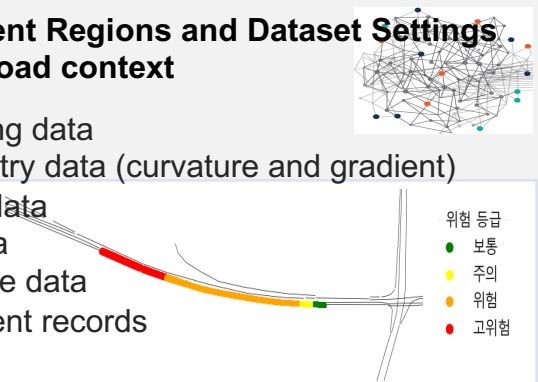


Research Proposal I :

AI and Mobility Big Data–Driven Road Safety Assessment and Real-Time Warning System

HORIZON-CL5-2026-01-D6-14:

Predicting and avoiding road crashes based on Artificial Intelligence (AI) and big data

Title	AI and Mobility Big Data–Driven Road Safety Assessment and Real-Time Warning System
Main Objectives	To develop a real-time hazard prediction and warning system using multi-source Big Data integration, advanced data fusion and machine learning algorithms
Ideas	Across Different Regions and Dataset Settings in European road context - Vehicle driving data - Road geometry data (curvature and gradient) - Digital map data - Weather data - Traffic volume data - Traffic accident records - More... 

Key Partners	
Type	Example Expertise
Data Analytics & AI Research Institutes / Universities	Machine learning for multimodal data fusion, spatiotemporal risk modeling, digital twins for traffic networks
Diverse and Massive Big Data Collection, Post-processing, and Integration	Traffic, weather, crash, and other data collection, post-processing, and integration
National / Regional Road Authorities or Safety Agencies	Traffic incident reporting, black-spot management, road safety monitoring
ITS Industry Partners / SMEs	Edge AI platforms, sensor data gateways, in-vehicle warning systems
European Living Labs / Smart Cities	Urban data platforms, digital infrastructure for connected mobility

Experience & TO-BE

- AI model for assessing the safety level of road segments, funded by HMC

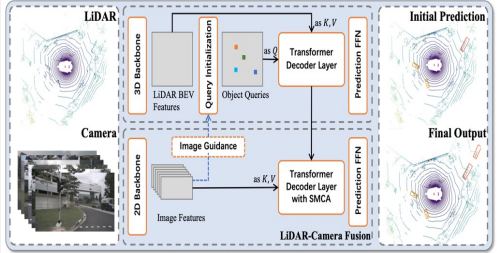
Data Preprocessing and Input			Model	Output														
DTG data	Accident Rate Prediction Based on Driving Environment and Risky Driving Behaviors <table border="1"> <tr> <th>Roads Type</th> <th>Links Type</th> <th>Geometry Groups (Use Cases)</th> </tr> <tr> <td>Speed Limits</td> <td>Curves Radius</td> <td rowspan="5"> Weather conditions Traffic Volume Overspeed ratio Rapid deceleration ratio Sudden Stop ratio </td> </tr> <tr> <td>Number of lanes</td> <td>Fog status</td> </tr> <tr> <td>Weather conditions</td> <td>Traffic Volume</td> </tr> <tr> <td>Overspeed ratio</td> <td>Rapid deceleration ratio</td> </tr> <tr> <td colspan="2">Sudden Stop ratio</td> </tr> </table>		Roads Type	Links Type	Geometry Groups (Use Cases)	Speed Limits	Curves Radius	Weather conditions Traffic Volume Overspeed ratio Rapid deceleration ratio Sudden Stop ratio	Number of lanes	Fog status	Weather conditions	Traffic Volume	Overspeed ratio	Rapid deceleration ratio	Sudden Stop ratio		Encoding Categorical data numeric conversion Dataset separation Separate train data and test data 8:2 Standardization Reproducibility fixed random state = 42 Model used Random Forest XGBoost DNN	Evaluation Metric - R² - RMSE Risk Segment Urban Road Right-turn lane Speed limit 50 km/h or less Curve radius 60 (m) or less
Roads Type			Links Type	Geometry Groups (Use Cases)														
Speed Limits			Curves Radius	Weather conditions Traffic Volume Overspeed ratio Rapid deceleration ratio Sudden Stop ratio														
Number of lanes			Fog status															
Weather conditions			Traffic Volume															
Overspeed ratio	Rapid deceleration ratio																	
Sudden Stop ratio																		
Geometry Data																		
Weather Data																		
Traffic Volume Data																		
Traffic accidents Data																		

Expanding the framework for the integration of heterogeneous datasets and developing an adaptable safety estimation model applicable to different types of collectable data

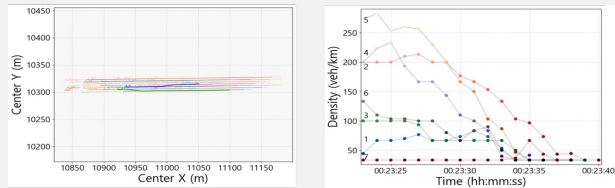
Research Proposal II :

Traffic Monitoring Based on Autonomous Vehicle Sensor Data Fusion

HORIZON-CL5-2026-01-D6-03: Next-generation environment perception for real world CCAM operations: Error-free and secure technologies to improve energy-efficiency, cost-effectiveness, and circularity (CCAM Partnership)

Title	Traffic Monitoring Based on Autonomous Vehicle Sensor Data Fusion
Main Objectives	To enable real-time detection and analysis of traffic flow dynamics and safety-critical situations utilizing abundant AV sensor data Leveraging AVs as mobile detectors
Ideas	Exploring potential benefits of Avs as mobile traffic detectors Utilization of data collected from autonomous mobility or its integration with infrastructure data 

Key Partners	
Type	Example Expertise
Data Analytics & AI Research Institutes / Universities	Sensor data collection post-processing of point cloud data, and AI algorithm development
Automotive / ADAS Technology Companies, research institution, and Universities	Multi-sensor fusion, perception pipeline, vehicle data standardization (ASAM OpenLABEL, OpenX)
Connected Mobility Infrastructure Operators	5G/6G-V2X, edge computing, ITS-G5 testbeds
Traffic Simulation & Modeling Research Centers	Digital twins, microscopic/multi-agent traffic simulation, C-ITS evaluation
Public Authorities / Transport Ministries	Policy use cases, safety KPIs, data governance frameworks

Experience & TO-BE
- Tested with autonomous vehicles using LiDAR and GPS/IMU - Sensor fusion improved detection accuracy by up to 25% 
Expanding the framework to integrate multi-vehicle and multi-sensor data streams (LiDAR, Radar, Camera, GNSS/INU, and Infra. Data, etc.)

Potential Collaborating Partners

**AI Modeling
Data Science**

**Data Collection
and Pilot**

**AV Sensors and
the data**

**Testing in Digital
Twin and Testbed**

**Digital
Infrastructure**

Potential Korean Partners in Academic, Research, and Industry (ITS, Mobile Comm., Autonomous Vehicle, and Automobile Manufacture)



Cho Chun Shik Graduate School
of Mobility | 조천식 모빌리티 대학원



Potential Partners from Technical University of Munich & iABG

A.I./Big Data in Transport & Mobility

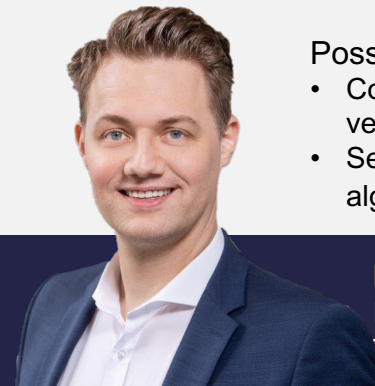


Possible Contributions

- Designing AI-based traffic behavior analysis and risk detection models
- Development of risk prediction algorithms using multi-source traffic data

Prof. Dr. Constantinos Antoniou
Chair of Transportation Systems Engineering
Technical University of Munich

A.V. Sensor Data Fusion



Possible Contributions

- Collection and processing of autonomous vehicle sensor data
- Sensor data fusion, and AI learning algorithms

Prof. Dr. Johannes Betz
Professorship Autonomous Vehicle Systems
Technical University of Munich

A.V. Testbed and Procedure



Possible Contributions

- Collection and processing of autonomous driving data on testbeds and real roads
- Data mapping and safety index development based on digital maps

Dr. Martin Margreiter
Head of Mobility Innovation Campus
Industrieanlagen-Betriebsgesellschaft mbH

Some Updates

Jaehyun (Jason) So

Designated as the National Contact Point (NCP) for Advanced Mobility under the Horizon Europe Programme, effective from 4Q 2025.

AJOU UNIVERSITY

is seeking an exchangeable graduate-level education program through its Data, Network, and AI Convergence Graduate Program, supported by the Korean Ministry of Land, Infrastructure, and Transport.

- *Currently operating three major collaborative programs with*
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Updates & Contacts

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If you are interested in collaborating with me and my partners, or if you are looking for a partner in Korea, please feel free to reach out — as an NCP and a friend :)

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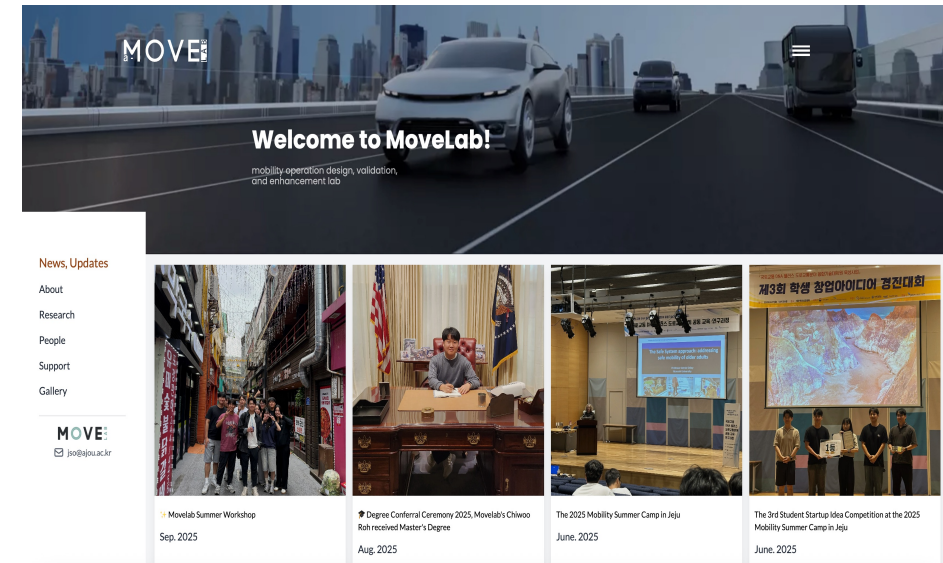


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감사합니다

Thank You

Vielen Dank



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