

News Release

Hyundai Motor Group Accelerates Autonomous Driving Innovation with AI-Powered Data Flywheel

- Hyundai Motor Group hosts “HMG Autonomous Driving Media Day”, outlining its roadmap for the next era of autonomous driving; first showcase of Level 2++ technology
- Dual-Track strategy accelerates Level 2+ production through NVIDIA collaboration while internalizing key autonomous driving technologies through proprietary Atria AI
 - ... NVIDIA solutions-based Level 2+ production targeted for the H1 2028 and Level 2++ in H2 2028, followed by Atria AI-powered Level 2++ vehicles in H2 2029
 - ... Progressive sensor standardization across Hyundai Motor, Kia, 42dot and Motional brings together autonomous driving capabilities across the Group
- Data Flywheel strategy establishes a virtuous cycle of data collection, training, validation and deployment to continuously advance AI capabilities
 - ... Expands the Group’s data ecosystem by leveraging its annual sales of 7 million vehicles and Data Union framework, while implementing a data-centric development framework based on hard example mining, continuous training and SER
 - ... Real-world Level 4 pilot to launch in Gwangju by year-end in partnership with Korea’s Ministry of Land, Infrastructure and Transport to secure large-scale validation data
- 42dot shares Vision-Language-Action (VLA)-based autonomous driving technology that integrates visual information and language-based reasoning to guide driving decisions
 - ... VLA research focuses on addressing edge cases, while parallel development of end-to-end (E2E) autonomy and VLA models enhances technical stability and scalability
 - ... VLA model validation currently underway, with on-road testing and the full development process scheduled to run through early next year

- New Atria AI urban driving videos — an [executive ride-along](#), [one-take footage](#), and [edge-case handling](#) — are live on the Group's YouTube channel

SEOUL, September 13, 2026 – Hyundai Motor Group (the Group) announced that it has put its **Data Flywheel** into full operation, marking a new phase in its **autonomous driving technology strategy**. The system creates a virtuous cycle of data collection, AI training, validation and deployment to secure a competitive advantage through accelerated learning and technology development.

During the Group's "HMG Autonomous Driving Media Day" at **42dot** headquarters in Gyeonggi Province, Korea, the Group presented its autonomous driving development strategy, technology roadmap, key achievements and implementation plans. The presentation underscored the Group's strategic positioning in the global autonomous driving technology competition and detailed how integrated data and AI systems form the foundation for next-generation vehicle technology.

At the event, the Group identified the **Data Flywheel** as a key element of its autonomous driving competitiveness and shared the operational framework and execution strategy that transforms large-scale real-world driving data into continuous technology improvements.

42dot also introduced key technologies and the development progress for the Group's proprietary autonomous driving artificial intelligence, **Atria AI**, while outlining the background and future plans for its **Vision-Language-Action (VLA)** technology development initiative.

In line with the event, the Group unveiled footage of an Atria AI-equipped **SDV Testbed** navigating complex urban traffic without driver intervention. Operating at a Level 2++ capability, the autonomous driving system showcased in the footage illustrates how the Data Flywheel is enabling a continuous cycle of learning, validation and performance improvement. The footage is available on the [Group's official YouTube channel](#).

"Autonomous driving competition is no longer about comparing specific features. Competitiveness is determined by how much data you secure, how quickly you learn and how effectively you can reflect those results in actual products and services. At its core, autonomous driving competitiveness comes down to having systems that enable continuous, rapid learning. Hyundai Motor Group will develop autonomous driving technology that customers can trust, based on a virtuous cycle of data, AI and validation. Our goal is to ensure the safety and quality levels customers can trust while we learn and improve rapidly." – **Minwoo Park, President and Head of Advanced Vehicle Platform (AVP) Division at Hyundai Motor Group and CEO of 42dot**

How Does the Dual-Track Strategy Position the Group for Competition?

In March, Hyundai Motor Group announced a collaboration strategy with NVIDIA, introducing a dual-track approach that combines the rapid deployment of proven autonomous driving technologies with the development of proprietary AI capabilities.

Track One: NVIDIA Collaboration for Accelerated Mass Production

The Group will integrate [NVIDIA's validated vehicle AI computing platform](#) and autonomous driving software into its **software-defined vehicle (SDV)** architecture. This track prioritizes accelerated deployment while building a foundation for scalable data-driven development.

- Production vehicles equipped with **NVIDIA solutions-based Level 2+ autonomous driving capabilities** targeted for the **first half of 2028**; **Level 2++** production vehicle targeted for the **second half of 2028**
- Progressive standardization of sensor systems used across Hyundai Motor, Kia, 42dot and Motional around **NVIDIA DRIVE Hyperion 10**
- More **consistent data collection** and utilization for AI training and validation

Track Two: Atria AI for Technology Independence and Long-Term Capability

In parallel, the AVP Division and 42dot are continuing to advance Atria AI, a proprietary end-to-end (E2E) autonomous driving system jointly developed by the two organizations. The teams operate under an integrated development framework.

- Production of **Atria AI-powered Level 2++ vehicles** targeted for the **second half of 2029**
- Phased progression of autonomous driving capabilities based on real-world driving data collected from production vehicles

This dual-track strategy enables the Group to deliver advanced capability to customers in the near-term while building sustainable technology advantage for the future.

How Does the Data Flywheel Accelerate Learning and Capability Advancement?

The **Data Flywheel** operates as a virtuous cycle in which data collected from vehicles is used to train and validate AI models, with improved models subsequently deployed back to vehicles to generate new data. The Group also benefits from significant advantages at the starting point of the Data Flywheel: data acquisition.

Data Acquisition at Global Scale

Hyundai Motor and Kia sell more than **7 million vehicles** annually across approximately **190 countries and regions** worldwide. This global production footprint provides a foundational advantage for autonomous driving data collection. Currently, the Group operates approximately **40**

dedicated data collection vehicles around the clock to gather driving data. The collected datasets include not only routine driving scenarios, but also a wide range of real-world edge cases:

- Road construction zones and infrastructure variations
- Severe weather conditions
- Abrupt lane changes and emergency maneuvers
- Parked vehicles on side streets and narrow roads
- Complex urban traffic dynamics

Advanced Learning Techniques

While large volumes of driving data are important, autonomous driving AI performance is not determined by data volume alone. Model advancement depends on how effectively developers can identify situations that challenge AI systems and focus learning on those scenarios.

To accelerate AI model improvement, Hyundai Motor Group has been integrating new technologies into its Data Flywheel since earlier this year.

- **Hard Example Mining** — Automatically identifies challenging driving situations, or edge cases, that AI models find difficult to recognize or interpret, and prioritizes those scenarios for training.
- **Continuous Training Pipeline** — Continuously incorporates newly acquired data from real-world driving and validation processes into model training, enabling repeated performance improvements over time. Vehicle evaluation findings are fed back into data collection and model development, shortening development cycles and accelerating model refinement.
- **Virtual Validation Technology** — Virtual validation is another key component of the Data Flywheel. Hyundai Motor Group reconstructs real-world driving data into three-dimensional environments and utilizes advanced graphics technologies such as 3D Gaussian Splatting to recreate scenarios that are difficult or potentially unsafe to reproduce through real-world testing. This enables engineers to repeatedly evaluate models across diverse edge cases while verifying that newly trained models do not degrade existing performance.
- **Follow-the-Sun Development** — Connecting development centers in South Korea and the U.S., the Group operates a Follow-the-Sun development model. By leveraging differences in time zones, teams sequentially carry out data collection, issue analysis and model improvement activities, enabling continuous 24-hour development.
- **Special Event Recorder (SER) Integration** — The Group is also gradually integrating its Special Event Recorder (SER) into the Data Flywheel. SER is a system that automatically records and stores significant events and related data that occur during autonomous driving. The recorded data is primarily used to support AI model training and performance improvement.

The Group is also exploring ways to further enhance SER so that AI models can more effectively identify challenging edge cases and automatically secure relevant datasets required for performance improvements.

- **Data Union Ecosystem** — To expand the utilization of data across and beyond the Group, Hyundai Motor Group is establishing a Data Union framework based on standardized sensor architectures and data structures. Rather than simply exchanging raw data between organizations, Data Union establishes a data ecosystem that enables data generated across multiple vehicles and organizations to be accumulated under common standards and utilized for AI training.

The Group will initially focus on improving data **utilization** across Hyundai Motor, Kia, 42dot and Motional, laying the groundwork for future expansion.

Why Is Real-World Level 4 Validation Critical?

Alongside mass-production technology development, the Group is pursuing real-world Level 4 autonomous driving validation. In partnership with South Korea's **Ministry of Land, Infrastructure and Transport**, the Group plans to deploy the **Atria AI-equipped SDV Pace Car** in Jeonnam-Gwangju Special Metropolitan City, South Korea by year-end.

This pilot project will operate autonomous vehicles in actual Korean road environments characterized by complex traffic dynamics and unpredictable variables, conditions fundamentally different from controlled test tracks. Diverse driving scenarios and contingency situations encountered during real-world deployment will be captured and fed directly back into the Data Flywheel for AI learning and performance improvement.

Through this approach, the Group enhances the completeness of Level 2+ mass-production driver assistance technology and the validation of advanced Level 4 autonomous driving capabilities.

"Autonomous driving competitiveness depends not on how much data you secure, but on how rapidly you can connect data to learning, validation and performance improvement. Through the data flywheel system now in full operation, we expect continuous improvement of issues identified on real roads and rapid technology advancement." – **Junghyun Kwon, Executive Vice President and Head of Hyundai Motor Group's Autonomous Driving Development Center, and 42dot Autonomous Driving Division Lead**

"Good autonomous driving AI ultimately starts with high-quality data. Hyundai Motor Group continuously improves the performance and maturity of Atria AI through an integrated development cycle that spans data collection, model training and real-world vehicle validation." – **Seonggyun Jeong, Group Lead of 42dot's Atria Group**

How Does VLA Technology Advance Autonomous Driving Toward Physical AI?

Beyond conventional autonomous driving development, 42dot is also advancing next-generation technology through **Vision-Language-Action (VLA)** — a framework combining visual information recognition, language-based reasoning and action generation into a single framework.

42dot plans to develop VLA models alongside its existing **end-to-end (E2E) autonomous driving models** to enhance the stability and scalability of autonomous driving technologies while providing a range of solutions tailored to different vehicle hardware specifications and customer needs.

VLA is regarded as a key technology for **Physical AI** applications, including autonomous driving and robotics. While conventional E2E models directly connect driving inputs to vehicle actions, VLA models add language-based situational understanding and reasoning, enabling improved decision-making and explainability in complex driving scenarios.

42dot expects VLA technology to enhance the ability to respond to rare driving situations by leveraging language-based reasoning and large-scale pre-trained knowledge that is difficult to learn from driving data alone.

- **Data Flywheel Integration**

42dot is also applying the Data Flywheel to VLA development. When driving issues arise, the team analyzes the root cause, reinforces the relevant driving policies and data, then retrains the model to improve performance.

- **VLA Development Progress**

Currently, 42dot's VLA-based autonomous driving technology is in the simulation-based model validation stage.

The Group plans to activate full development process, including real-vehicle testing, from **late 2026** through **early 2027**. Driving issues identified in real-world environments will be incorporated back into learning and validation processes to continuously improve the maturity of VLA models.

- **Explainability Demonstration**

42dot released development footage showing how the VLA model interprets driving situations and outputs its reasoning in natural language. In the example, text appeared on screen during vehicle operation, describing both the action taken and the rationale behind it.

"VLA is a core technology for implementing Physical AI where AI goes beyond simply driving to understand situations, reason through them and act. Starting with autonomous driving, it will provide

the foundation to expand into diverse fields such as robotics and beyond.” – HeeSeok Lee, Group Lead of 42dot’s Trion Group

What Does the Newly Released Seoul Urban Driving Footage Reveal About Atria AI?

The Group also released video footage demonstrating an **Atria AI-equipped SDV Testbed** navigating actual Seoul urban traffic without driver intervention. The footage demonstrates how the Data Flywheel is producing measurable performance improvements in real-world conditions.

Rather than focusing on controlled test scenarios, the videos highlight how the Group’s autonomous driving technologies perform in the complexity of everyday urban environments and illustrate their potential for continued advancement.

The footage consists of three categories:

Executive Ride-Along: Minwoo Park and Seonggyun Jeong traveled in an autonomous vehicle through central Seoul as the vehicle navigated actual traffic conditions including expressways, major thoroughfares, bridges and urban streets. During the ride, they discussed Atria AI’s development process, current technical capabilities, autonomous driving decision-making mechanisms and future development directions. The footage also showcases how the vehicle perceives surrounding traffic conditions, makes driving decisions and responds to diverse road environments in real time.

Link to video on the Group’s official YouTube channel: <https://youtu.be/5c5ojBJUznU>

One-Take Urban Driving Footage: Three unedited video sequences captured autonomous driving performance in diverse environments, including:

- Congested morning rush-hour traffic in Gangnam
- High-density traffic conditions in Jamsil, including frequent interactions with large vehicles such as buses
- Rainy urban driving conditions in Pangyo

Each video runs approximately two to four minutes and was filmed in a one-take format without edits other than playback speed adjustments, providing an unfiltered view of autonomous driving performance in real-world traffic conditions.

The footage demonstrates how Atria AI recognizes and interprets a wide range of road elements, including vehicles, pedestrians, lane markings, intersections and traffic signals, while continuously adapting to changing traffic environments.

Links to Videos on the Group’s official YouTube channel:

- Gangnam: <https://youtu.be/-7BEzmdrlcU>

- Jamsil: <https://youtu.be/MxkVELlgoWE>
- Pangyo: https://youtu.be/qBAFzUPKA_o

Edge Case Handling: The third video focuses on Atria AI's response to key edge cases encountered in urban driving environments.

Ten representative scenarios are included, such as:

- Avoiding vehicles parked along the roadside
- Responding to sudden vehicle cut-ins
- Navigating unprotected left turns
- Detecting pedestrians in congested areas
- Identifying oncoming vehicles on narrow neighborhood roads

Collectively, these scenarios demonstrate how the autonomous driving system responds to the diverse variables encountered in complex urban traffic environments.

Link to Video on the Group's official YouTube channel: <https://youtu.be/c9DipX33EVM>

"Autonomous driving is the flagship Physical AI technology and sits at the center of the automotive industry's transformation into an AI industry. By combining the Group's global mass production capabilities with 42dot's AI and software technology and data flywheel-based learning system, we will implement trustworthy autonomous driving technology for our customers. Development speed and safety are not conflicting values. The more exceptional situations we discover and learn from, the safer autonomous driving becomes. Hyundai Motor Group will enhance both development velocity and safety, maintaining the principle of applying only thoroughly validated technology to our vehicles." – **Minwoo Park, President and Head of AVP Division at Hyundai Motor Group and CEO of 42dot**

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About Hyundai Motor Group

Hyundai Motor Group is a global enterprise that has created a value chain based on mobility, steel, and construction, as well as logistics, finance, IT, and service. With about 250,000 employees worldwide, the Group's mobility brands include Hyundai, Kia, and Genesis. Armed with creative thinking, cooperative communication, and the will to take on any challenges, we strive to create a better future for all.

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