News Release

Hyundai Motor Group Announces Future Roadmap for Software Defined Vehicles at *Unlock the Software Age* Global Forum

- Hyundai Motor Group (the Group) to transform customer experience and deliver an unprecedented era of mobility via constantly evolving software technology
  - … Over-The-Air (OTA) software updates for all models by 2025 will offer enhanced performance and functionality anytime, anywhere across all global markets, to keep all models up to date
  - … 20 million vehicles expected to be registered to the Group's Connected Car Services (CCS) worldwide by 2025
  - … Industry-leading, internally developed Connected Car Operating System (ccOS) will offer customers personalized services and process data at blazing speeds
  - … Data-based platform partnerships with industry sectors such as logistics, accommodation, leisure, and entertainment will create an open ecosystem and deliver a paradigm shift in mobility
- Constantly upgradeable software will provide diverse, stable revenue streams while offering fresh functionality and features to keep customers' vehicles up to date
  - … Platform standardization will cut costs and development time to enhance profitability
- Combining hardware and software technologies will significantly strengthen the Group's capabilities and consolidate its lead in defining the future of global mobility
  - … New Global Software Center to develop software-defined mobility devices and solutions, surpassing the vehicle market to enter the mobility and logistics market
  - … 18 trillion won investment by 2030 in Global Software Center and R&D HQ to bolster software capabilities for SDV development

SEOUL, October 12, 2022 – Hyundai Motor Group (the Group) today announced a new global strategy to transform all vehicles to Software Defined Vehicles (SDVs) by 2025. The industry-leading initiative, presented during the Group's *Unlock the Software Age* global online forum, will deliver an unprecedented era of mobility, giving customers the freedom to remotely upgrade the performance and functionality of their vehicles anywhere at any time.

The Group also shared plans to transform the customer experience throughout the vehicle's entire lifetime and deliver a new era of mobility via constantly evolving software technology.

Hyundai Motor Group's constantly evolving mobility and software technology will ensure that all models, including those already purchased, remain up to date. This will enable vehicle functions, including safety, convenience, connectivity, security, and driving performance, to be upgraded via Over-The-Air (OTA) software updates. Based on the Group's next-generation EV platform, integrated controller, and an internally developed Connected Car Operating System (ccOS), all Group vehicles will be equipped to receive OTA software updates by 2025.

The Group expects 20 million vehicles to be registered to its connected car service worldwide by 2025. Connected vehicles equipped with cutting-edge telecommunication features will create unprecedented value and possibilities and provide customers personalized services, such as software subscriptions.

Furthermore, connected car data will network with future Group mobility solutions, including Purpose Built Vehicles (PBVs), Advanced Air Mobility (AAM), robotaxis and robots. By establishing a new data platform, innovative services will be provided through connecting and processing the various data generated throughout the car life cycle, as well as promoting the creation of an open ecosystem in partnership with diverse industries such as logistics and accommodation.

The Group will also invest heavily in software technology to integrate hardware and software technologies and enhance and internalize mobility technology capabilities. By 2030, the Group plans to invest 18 trillion won in resources, including the establishment of a new Global Software Center to bolster its software capabilities and accelerate Software Defined Vehicle development.

"By transforming all vehicles to Software Defined Vehicles by 2025, Hyundai Motor Group will completely redefine the concept of the automobile and take the lead in ushering in a never-before-experienced era of mobility," said **Chung Kook Park, President and Head of R&D Division, Hyundai Motor Group**. "Creating visionary vehicles empowered with the ability to evolve through software will enable customers to keep their vehicles up to date with the latest features and technology long after they have left the factory."

Over-The-Air (OTA) software updates for all HMG models by 2025

From 2023, all newly launched vehicles of Hyundai Motor Group will be equipped to receive Over-The-Air (OTA) software updates enabling customers to keep their vehicles up to date. This transformation will apply not just to electric models, but also internal combustion engine vehicles. All of the Group's vehicle segments sold worldwide will evolve to be software defined by 2025.

Customers will be able to remotely upgrade the performance and functionality of their vehicles anywhere at any time, without any need to take them to a service center. And as the vehicle can constantly be updated, its residual value will also be enhanced. The Group initially introduced this service in 2021, and from 2023 will expand it across vehicle models in global market regions able to receive Connected Car Services (CCS). By 2025 all Hyundai Motor Group vehicles will be equipped to receive OTA software updates.

The Group will also offer FoD (Feature on Demand) services next year. This will give customers the ability to select and purchase functions and features that meet their needs and tastes, and the freedom to create vehicles that best match their lifestyles.

The vast amount of data generated by the 20 million subscribed vehicles to the Group's CCS will provide the basis for the further development of personalized services. The Group plans to continuously offer customized services that can enhance individual customer requirements and handle vehicle big data exceptionally quickly and ultra-reliably.

Next-generation EV platform to accelerate SDV transformation

The Group plans to significantly reduce the time required for all mass-production processes, including planning, design, and manufacturing, by developing a shared hardware and software platform for vehicles. This will enable vehicle components to be shared across different vehicle segments, leading to more efficient vehicle development and greater cost reductions. Reducing vehicle complexity will further enhance the effectiveness of SDV technology.

Constantly upgradeable vehicle software will bolster Hyundai Motor Group's ability to secure diverse and stable revenue streams by providing fresh vehicle features and functionality and leveraging selected data to offer personalized services for each customer. The Group's profitability will also be improved by shortening vehicle development time and reducing costs through platform standardization.

The Group will also introduce vehicles in 2025 based on its two new EV platforms, eM, and eS. The new EV platforms will be created under the Group's Integrated Modular Architecture (IMA) system.

The eM platform is being developed specifically for EVs across all segments and will provide a 50 percent improvement in driving range on a single charge compared to current EVs. The eM platform is also being developed to support Level 3 or higher autonomous driving technology and OTA software update features.

The Group's eS platform will be developed as an EV 'skateboard' exclusively for Purpose Built Vehicles (PBVs), with a fully flexible structure to meet B2B demands, and provide tailor-made solutions for companies operating in the delivery, logistics, and car-hailing sectors.

"In 2025, Hyundai Motor Group will present vehicles with two platform types: eM, a passenger EV-dedicated platform; and eS, an exclusive platform for Purpose Built Vehicles," said **Paul Choo, Executive Vice President of Head of Electronics & Infotainment Development Center of Hyundai Motor Group.** "These new platforms are evolving under Hyundai Motor Group's 'Integrated Modular Architecture', which will lead to further standardization and modularization of core components of electric vehicles, such as batteries and motors, while offering advantages in sectors additional to electric vehicles."

The Group's Integrated Modular Architecture will facilitate the standardization and modularization of key EV components. By standardizing the batteries and electric motors, for example, which currently vary across each EV model, the Group will flexibly apply common components to each vehicle, thus efficiently expanding its lineup.

The Group is also similarly integrating the vehicle controller. Previously, the software system needed to be upgraded separately for each controller to upgrade the functions of vehicles. However, an integrated controller delivers a solution to make this process more systematic and efficient. Thus, the overall number of controllers can be significantly reduced by integrating the lower-level electrical components managed by top-level controllers.

The integrated controller will enable the efficient development of diverse vehicle segments and strategic models optimized for each region and ease the process of adding new features and improving performance. The cycle of software updates will be shortened, whereas the frequency will increase. The technology also enables the Group to respond flexibly and swiftly to meet rapidly changing market and customer needs.

The infotainment and Advanced Driver Assistance System (ADAS) that the Group already mass produced are both currently undergoing function advancements with the introduction of the latest integrated controller technology. By 2025, both comfort and driving controllers will also be gradually integrated.

"The electrical and electronic architecture can be thought of as an organically connected structure that improves the function of a vehicle's electrical device components," said **Hyung Ki Ahn, Vice President of Electronics Development Group.** "To develop the growing number of electrical components with systematic efficiency, Hyundai Motor Group chose to implement 'Domain centralized architecture,' which structures groups and integrates controllers throughout the vehicle into four areas, Comfort, Driving, Infotainment, and ADAS. As this architecture significantly reduces development complexity and enables software updates to be carried out effortlessly without any

requirement to manually modify the controller, it is ideal for presenting a variety of vehicle segments, and region-specific models tailored for different countries. It also enables us to respond flexibly to what consumers want in this fast-changing market."

Groundbreaking Connected Car Operating System (ccOS)

The Group's highly innovative, internally developed Connected Car Operating Systems (ccOS) will prove key to the Group's ambition to take the lead in providing transformative global mobility solutions. The ccOS software platform can be applied to all controllers and can maximize hardware performance through extremely high computing power.

To efficiently collect and process the large amount of information generated by connected cars, high-performance information processing semiconductors are required. Hence, the Group is working with NVIDIA, a leader in AI computing, collaborating on loading an optimized ccOS onto NVIDIA DRIVE®, a high-performance information processing semiconductor.

NVIDIA provides world-leading technological strengths in AI, machine learning, graphics cognition, and processing, and the company's high-performance NVIDIA DRIVE® platform enables large-scale data computation processing at an ultra-fast pace. The Group signed a technology development agreement with NVIDIA in 2015 and is conducting research to apply connected car technology to commercialized mass-produced vehicles.

Based on its integrated controllers and internal software platform, the Group is also significantly strengthening its competitiveness in autonomous driving technology.

The Group's advanced ccOS operating system will support the software technology required to analyze and process data ultra-rapidly, provided by the vast data collection capabilities of technology such as the sensors within the cameras, radars, and LiDARs mounted on the vehicle.

"This year, the Group will apply an advanced Highway Driving Pilot (HDP) on the Genesis G90, which is a Level 3 technology for autonomous driving based on the second-generation integrated controller," said **Woongjun Jang, Senior Vice President and Head of Autonomous Driving Center of Hyundai Motor Group. "**The Group is also developing its Remote Parking Pilot (RPP) for Level 3 autonomous driving."

The Group is developing a third-generation integrated controller based on the next-generation high-performance semiconductor to advance autonomous driving technology. The new integrated controller will enable even faster computation and more efficient control by installing a higher performance CPU and increasing the integration between controllers compared to the currently commercialized second-generation integrated controller.

The third-generation integrated controller will become the basis for the Group's expansion of mass-producing autonomous driving Level 3 vehicles as well as the commercialization of Level 4 and Level 5 autonomous driving levels in due course. It is also being developed to deliver improved heat dissipation, lower noise levels and reduced production costs."

Creating innovative services and new mobility experiences

The Group is also building a new data platform that can combine and process data generated throughout the vehicle's entire life cycle, including manufacturing, production, and operation, which will be used to create a broad range of innovative services.

"Hyundai Motor Group's data platform will not only be simply for driving. It will also play an important role in enhancing the convenience and diversity of the customer's mobility experience by engaging throughout the vehicle's entire life cycle," said **Eunsook Jin, Executive Vice President and Head of ICT Innovation Division of Hyundai Motor Group.** "Going forward, we'll also help create a new mobility ecosystem, connecting cars with other mobility devices, based on data connectivity and scalability."

The Group's data platform will focus on technology capable of identifying how data at each stage of the vehicle's life cycle is generated, in addition to selectively collecting and analyzing the necessary data to provide valuable services to customers. Data collated through the vehicle's high-performance controller will be continuously processed and analyzed with deep learning technology to ensure optimum speed and efficiency.

To this end, the Group is steadily strengthening its staffing and resource capabilities to enable it to create valuable information and services by quickly and stably processing large amounts of data. In addition to the tens of thousands of connected cars worldwide, data will be harvested from multiple additional sources, such as traffic signals, infrastructure, and satellite navigation mapping. In addition, the Group plans to contribute to the creation of a new mobility system by connecting various future mobility devices based on data connectivity and scalability.

Combining hardware and software technologies will enable Hyundai Motor Group to improve and internalize mobility technology capabilities and reinforce the Group's determination to take the lead in the future of mobility.

Future mobility and new challenges

The Group foresees a future where the mobility industry paradigm is entirely transformed, enabling people to enjoy convenient, seamless travel, even if they don't own a car. The Group's mid-to-long-term strategy will accommodate a new dimension of mobility service and software will be the core technology that delivers this future by seamlessly connecting new mobility devices and services.

"By 'movement,' we mean more than just moving between locations. We're talking about the entire end-to-end journey, from leaving your house and meeting friends, to things like charging, shopping, eating, and finally returning home," explained **Chang Song, President and Head of Transportation-as-a-Service (TaaS) Division of Hyundai Motor Group. "**Software-defined mobility will provide a holistic user experience based on vast mobility data and AI technology that understands user intentions and context. This way, all these journeys can be seamlessly connected."

To ensure it continues to lead in the provision of mobility solutions, Hyundai Motor Group will establish a Global Software Center to preemptively respond to changes in the future mobility market from a long-term perspective. The new Global Software Center will develop software-defined mobility devices and solutions, surpassing the vehicle market to enter the mobility and logistics market. It will also establish a system for self-developed mobility devices to connect to smartphone ecosystems while developing technologies and businesses that can connect and control mobility devices under one urban OS and make autonomous driving possible.

Hyundai Motor Group will invest 18 trillion won by 2030 in sectors such as the Global Software Center and R&D headquarters to further strengthen software capabilities for SDV development. The Group will also hire some of the world's best software developers and develop devices and services that prioritize UX to bring new experiences to the mobility market.

Technology to deliver a new era of mobility

"Today, Hyundai Motor Group has revealed the technology concepts, strategies, and future scenarios related to software-defined vehicles that will underpin the core of future mobility," said **Chung Kook Park, President and Head of R&D Division, Hyundai Motor Group.** "Our holistic approach will empower Hyundai Motor Group to lead the transformation in the mobility paradigm. As we take these technological innovations from imagination to reality, Hyundai Motor Group will unlock the future potential of the car and open up new possibilities to rewrite the customer experience and deliver a new way of life, abundant with meaning and value."

As the Group embarks on a new challenge to transform mobility and meet the needs of customers in the future, it will also continue to develop its award-winning models to meet the needs of customers today. The appeal of the Group's customer offerings has been consistently affirmed, as demonstrated recently by the range of awards bestowed on EV models from the Hyundai, Kia and Genesis brands by critics and media across the globe.

Already today, the Group's cutting-edge SDV technologies, such as Infotainment, Connectivity and ADAS are proving highly popular with customers, and as the technology rapidly develops further, a whole new world of possibilities will open up. This will pace the Group at the forefront of providing entirely new mobility solutions as society changes, transportation means evolve, and software-defined vehicles become commonplace.

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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, construction, 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.
For more information about Hyundai Motor Group, please see: www.hyundaimotorgroup.com

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