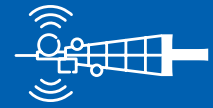


The background is a nighttime aerial view of Seoul, South Korea, featuring illuminated skyscrapers and a river. Overlaid on this are several blue decorative elements: a grid of dots in the top right, a wavy line in the top right, a diagonal line with a dot in the top left, and glowing blue light trails that curve through the city buildings. A white rectangular border frames the central text area.

Safe & Smart Mobility City, Seoul



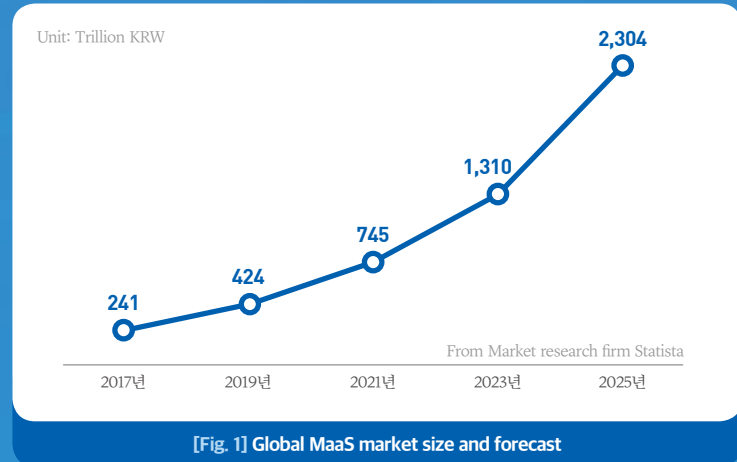
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The global mobility market,

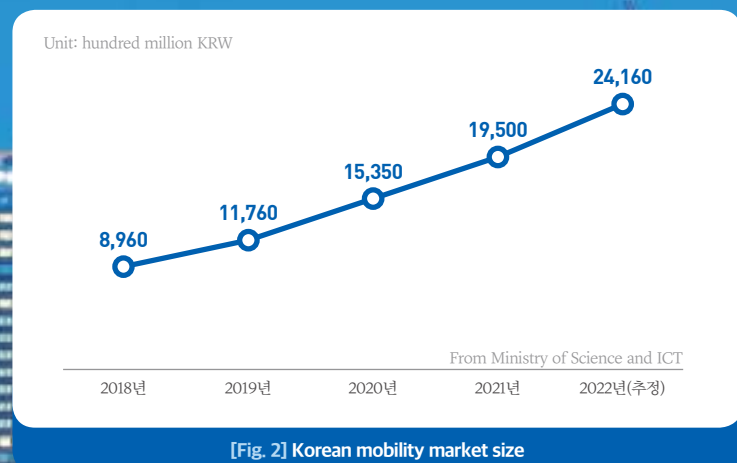
called Mobility as a Service (Maas), grew from about KRW 35 trillion (\$ 24.1 billion) in 2017 to about KRW 107 trillion (\$ 74.5 billion) in 2021.

This field is expected to continue to grow rapidly, reaching about KRW 188 trillion (\$131 billion) in 2023 and KRW 330 trillion (\$230.4 billion) in 2025.



Korea is also sparing no support and effort to foster the mobility industry in line with this global trend.

The size of the mobility market, which was KRW 896 billion (USD 6.2 billion) in 2018, increased by 31% to KRW 1,535 billion (USD 10.6 billion) in 2020, and is estimated to increase by about 28% to reach KRW 2,416 billion (USD 16.6 billion) by 2022.



As a capital and representative city of Korea, Seoul has been actively responded to market trends and leading the Korean mobility industry. Seoul ranked 8th in mobility innovation in a survey of global cities with a population of 3 million or more.¹⁾

#	CITY	COUNTRY	Digital Life				Mobility Innovation			Business Tech Infrastructure			Environmental Sustainability				TOTAL
			📄	📄	❤️	📝	🅑	🚗	🚗	📱	📱	📱	✈️	🏠	♻️	☁️	
1	London	UK	87.80	77.01	88.95	90.87	100.00	73.57	91.87	83.14	81.55	70.69	70.48	85.21	73.37	98.34	100.00
2	New York	USA	93.62	100.00	91.64	79.78	75.62	78.84	89.73	87.77	73.28	77.74	65.50	100.00	67.91	74.77	95.84
3	San Francisco	USA	100.00	98.91	100.00	73.83	85.59	75.08	67.32	100.00	73.28	74.16	74.92	90.47	67.91	74.77	94.43
4	Singapore	Singapore	88.98	94.39	87.05	79.51	65.47	77.87	94.84	73.78	84.50	72.69	50.98	86.60	76.05	100.00	94.21
5	Berlin	Germany	89.82	86.36	83.79	63.13	92.42	77.25	94.47	73.40	80.64	71.28	72.95	82.79	80.03	86.26	92.58
6	Rotterdam	Netherlands	84.11	94.83	80.02	62.01	86.00	83.53	90.91	52.09	100.00	78.22	60.99	85.45	71.66	94.70	91.44
7	Seattle	USA	89.55	97.29	92.83	66.81	82.34	87.07	69.41	79.93	73.28	75.30	91.96	88.59	67.91	74.77	90.40
8	Seoul	South Korea	91.33	96.37	84.73	87.67	76.11	73.79	82.56	61.32	82.78	71.35	52.97	82.51	81.88	63.73	87.50
9	Washington D.C	USA	90.92	99.95	88.10	65.58	75.27	89.19	70.47	80.35	73.28	74.26	56.96	95.40	67.91	74.77	86.77
10	Manchester	Uk	74.04	74.62	76.31	67.88	94.63	84.14	79.19	54.71	81.55	71.46	70.48	80.97	73.37	98.34	85.34

[Fig. 3] Mobility Innovation Ranking of Global Cities

In addition, according to the Electric Vehicles Initiative (EVI) announced by McKinsey in 2020, the competitiveness of the electric vehicle industry in Korea ranked 5th, which proves the status of the mobility industry in Seoul, Korea's representative city. Besides, Seoul boasts excellent electric vehicle distribution results, such as second in the number of registered cars in the country (over 6.31 million), first in the ratio of registered electric vehicles to the total number of registered cars, and third in the number of electric vehicles per quick charger for electric vehicles.²⁾

Behind these good achievements of Seoul are active mobility industry activities. The Seoul Motor Show, which began in 1995, has been upgraded into the Seoul Mobility Show in 2021. Beyond automobiles, it is evolving into an exhibition centered on future high-tech and eco-friendly mobility such as Urban Air Mobility (UAM), railroads, ships, aerospace, autonomous driving, IT convergence technology, infotainment, hydrogen cars, and electric vehicles.

In addition, the headquarters of Hyundai Motors, a global mobility company, is located in Yangjae-dong, Seocho-gu, Seoul. Various and key players in the mobility market are preparing for the future of Korea in Seoul including carpooling, car calling, rental car, vehicle management, bus sharing, parking, used car transaction, map, connected car commerce, micro mobility, new car and scrap car service, autonomous driving, etc.

Seoul is also actively participating in this trend. The 2040 Seoul Urban Master Plan announced by Seoul provides a glimpse of Seoul's future transportation blueprints and investment plans. Since Seoul knows that the success of the future mobility business depends not only on products and services, but also on the establishment of its infrastructure, it is working with global mobility company Mercedes-Benz to support domestic startups to build an artificial intelligence-based smart transportation infrastructure in Seoul. As such, Seoul knows better than any city that mobility is an important industry in terms of infrastructure as well as products and services.

1) Easypark Group's research of smart city parking solutions, traffic management systems, and clean transportation around the world

2) Korea Power Exchange (Dec. 2021), Supply and use status of electric vehicles and chargers

Current status of mobility market in Seoul



As a representative city of Korea, Seoul is functioning as the No. 1 mobility service based on various means of transportation and users. It held the Seoul Smart Mobility Expo 2021 (SSME 2021) in which 40 Korean and foreign companies with world-class technologies participated including Hyundai Motor, GS Caltex, Mercedes-Benz, Kakao Mobility, and 42dot. In addition, the cumulative number of rentals for Seoul's official bike rental service, Seoul Bike Ddareungi has increased significantly, reaching 23,705,000 in 2020.

Parking-sharing services such as Modu Parking are the most actively promoted by Seoul among sharing economy projects in the transportation sector as it has less potential for conflicts of interest, relatively low input costs, and is well-received by citizens. With active support from Seoul, more parking lots are expected to participate in the sharing project.

As such, Korea's mobility service begins in Seoul. Major mobility companies are also located in Seoul. The challenging spirit and creative services of these companies connect mobile and mobile, people and people, and regions and regions. In fact, Seoul can be said to be a good test bed for mobility companies.



[Fig. 4] The cumulative number of rentals for Seoul's official bike

Core players by field of mobility

The concept of the previous mobility market was limited to transportation; however, recently, the scope of the mobility market is expanded beyond transportation means to overall transportation services and even transportation infrastructure. The main services provided and the Seoul-based companies providing these services are as follows:

CARPOOL SERVICE

Modoo Shuttle 

Founded in 2017 and located in Seocho-gu, Seoul, Modoo Shuttle has provided shared commuter shuttle service. When those who have similar commuting routes are gathered, Modoo Shuttle provides a shuttle service. It achieved sales of about USD 1.99million as of 2021.

CAR SHARING SERVICE

Greencar 

Founded in 2011 and located in Gangnam-gu, Seoul, Greencar has introduced a car-sharing service for the first time in Korea. It won the first place in the car-sharing sector of the Korea Brand Power Index (K-BPI) for 5 consecutive years, and achieved sales of about USD 48million in 2021.

Popping Car 

Founded in 2019 and located in Gwangjin-gu, Seoul, Popping Car has been providing a free car rental service to the public with advertising expenses received by attaching paid advertisements to vehicles, and achieved about USD 0.1million in sales as of 2021.

CAR CALL SERVICE

Kakao Mobility 

Kakao Mobility, located in the metropolitan area, started its service in 2015 with the launch of Kakao T Taxi, and has been providing Kakao T and T Business, Kakao Navi, and Kakao Mobility autonomous vehicle services. It achieved sales of about USD 0.3billion as of 2021.

Value Creators & Company (VCNC) 

Founded in 2011, and located in Gangnam-gu, Seoul, VCNC Inc. provides an 'efficient transportation service' when receiving a call from a customer, through an optimal route by arranging the vehicle that can arrive first through the immediate dispatch system based on data. It achieved about USD 4.6million in sales as of 2021.

RENTAL CAR SERVICE

SK Networks



company representing Korea in the fields of information and communication, mobility, leisure, rental and home appliances, and in addition to rental car services, it is strengthening its mobility capabilities by acquiring the No. 1 fast-charging company for private electric vehicles. Already in 2020, its new business proportion exceeded 60% of the operating profit.

Team O2



Founded in 2015 and located in Gangnam-gu, Seoul, Team O2 has Carmore that provides price information and accurate reviews of rental cars scattered across the country. It exceeded USD 12million in sales in 2020.

Cardoc



Founded 2014 and located in Songpa-gu, Seoul, Cardoc has been a platform that provides services for vehicle repair comparison estimation, vehicle acquisition and management. Currently, about 3,000 excellent companies have entered Cardoc, which achieved sales of USD 12.5million as of 2021.

Team Yper



Founded in 2015, located in Gangnam-gu, Seoul, Team YPER is an IT startup that operates a car wash and possesses hand-washing and self-washing hardwares, and consignment insurance software. It signed an MOU with Hyundai Motors, a global automobile company, and was selected as the Tech Incubator Program for Startup (TIPS), recognized for its growth and technological prowess. As of 2022, it achieved about USD 0.8million in sales.

Callbus Lab



Founded in 2015, and located in Seongdong-gu, Seoul, Callbus Lab is a platform that provides information on about 300 chartered buses, 6,000 bus drivers nationwide, and achieved sales of about USD 0.5million as of 2021.

Modu Company



Founded in 2013 and located in Seongdong-gu, Seoul, Modu Company has operated a parking lot service for everyone, by providing information about 50,000 parking lots and 5,000 shared/affiliated parking lots. In cooperation with 21 local governments, 36 public institutions, NAVER, T-map, and about 20 foreign companies. As of 2022, it achieved sales of about USD 3.99million.

VEHICLE MANAGEMENT SERVICE

BUS SHARING SERVICE

PARKING SERVICE

Owin



Founded in 2015 and located in Seocho-gu, Seoul, Owin has been creating a service platform that integrates O2O service planning, HW and firmware development, SW development, data mining, and design to provide convenient and smart services to drivers. As of 2022, it achieved approximately USD 4million in sales.

**CONNECTED
CAR
COMMERCE**

Gbike



Founded in 2017 and located in Gangnam-gu, Seoul, Gbike is a mobility startup that operates 'Gcooter', an electric scooter sharing service, in over 50 cities across the country, and provides optimized services for boarding and device management. As of 2022, it achieved sales of about USD 25million.

**MICRO-
MOBILITY
SERVICE**

Nine2one



Founded in 2018 and located in Mapo-gu, Seoul, Nine2one launched the shared electric bike service, Elecle, in 2019 and achieved 200,000 cumulative members and 2 million cumulative use times in 2 years. It provides hardware development and production, bicycle maintenance and relocation services, such as bicycle rental APP, bicycle management control system, bicycle design and IoT module. Nine2one achieved about USD 0.9million in sales as of 2020.

LG Uplus



LG Uplus is a wired and wireless telecommunication service affiliate of the LG Group, a global company, located in Yongsan-gu, Seoul. To provide safe and differentiated autonomous driving services, LG Uplus plans to develop next-generation technology to diagnose abnormalities in autonomous vehicles with ACE Lab, a Korean autonomous driving solution company. In 2021, it carried out autonomous driving big data tariff project, and plans to provide a demand-responsive mobility service that shares mobility data generated by the movement of people and goods in 2022. Furthermore, in 2026, it is planning to build a Vertiport with the goal of commercializing UAM (Urban Air Mobility).

**AUTONOMOUS
DRIVING
SERVICE**

Hyundai Motors



Hyundai Motors is a global automobile manufacturing company headquartered in Seocho-gu, Seoul. In addition to the manufacture of eco-friendly vehicles such as hydrogen cars and electric vehicles, Hyundai Motors is promoting Urban Air Mobility (UAM), Purpose Built Vehicle (PBV), and Hub (Mobility Transfer Hub). Beyond vehicle innovation, it creates a platform for solving problems ranging from traffic jams to housing crises. In particular, Hyundai Motors recently acquired 42dot, a startup that develops autonomous driving and mobility solutions, to promote integrated platform services for all means of transportation for fully autonomous driving.



Hyundai Motors' Yongsan Mobility Hub Plan³⁾

Seoul announced that it would create a mobility hub through Urban Air Mobility (UAM) near Yongsan Station in connection with the Yongsan International Business District, which is being developed as the Silicon Valley of Asia.

Hyundai Motors has already selected the UAM business as a major business of the future. In 2019, Euisun Chung, the executive chair of Hyundai Motors Group, said, “30% of Hyundai Motor Group’s future business will be UAM,” and expressed his will to take the lead in the field of air mobility.

Hyundai Motors' plans are also consistent with Seoul's UAM initiatives. Seoul plans to operate a pilot route between Gimpo Airport and Yongsan International Business District in line with the commercialization of UAM aircraft in 2025, which includes the creation of a system in which people get off at Incheon and Gimpo airports by plane, arrive at Yongsan by UAM, and then transfer to GTX or subway. Further, UAM routes connecting major hubs in Seoul such as Incheon International Airport, Jamsil, and Suseo are also being considered.

Yongsan in Seoul is expected to become the core hub of Hyundai Motor's UAM business and the UAM hub of Korea. Hyundai Motors plans to build the largest urban-type future research center with a total floor area of 67,000 square meters, from the 5th basement floor to the 7th floor, and through this, it is expected that more expanded synergies will occur in the policies and projects promoted by Seoul and Hyundai Motors respectively.



Forecast of Hyundai Motors Future Research Center

3) Sisa Journal (July 27, 2022), Yongsan train depot development plan announced. Will be Hyundai Motor's UAM business accelerated?



Seoul mobility's game changers

Startups play a large role at the center of innovation that creates a new mobility life in Korea. Startups are creating innovation in the mobility industry based on active investment attraction.

T-map Mobility

received an investment of USD 154million from KB Kookmin Bank in August 2022. T-map Mobility provides services such as T-map navigation and parking, UT vehicle calling, T-map electric vehicle charging, T-map kickboard, and T-map API. In particular, T-map Mobility's T-map Auto is mounted on the new Volvo XC60. It plans to expand to parking, chauffeur service, and electric vehicle charging and payment service through T-map Auto including T Now, a recently launched service that informs of popular places in real time, 'T-map Celeb' which gives directions with the voice of a celebrity or character, etc.

Jin Mobility

received an investment of USD 61.5million in January 2022, with a corporate value of about USD 177million from Hana Securities, Everest partners, and Yuanta Investment. Hana Securities. Jin Mobility is a startup that operates 'I.M Taxi', a high-end shared taxi calling app in the Seoul area, and has applied advanced information technology such as AI-based vehicle dispatch and driver management systems to the taxi business. With this investment, it plans to increase the number of vehicles by 1,000 or more, focus on R&D to advance autonomous driving pilot service technology, increase vehicle lineup, and expand services in the metropolitan area and tourist areas.

Seoul Robotics

received a Series B phase USD 27million investment from KB Investment, Noh & Partners, Korea Development Bank, FuturePlay, Samsung Securities, and foreign investors Artesian Venture Partners (Australia) and Access Ventures (Hong Kong). Based on the 'infrastructure-based autonomous driving', Seoul Robotics implements functions and services that allow vehicles without autonomous driving functions to be driven like autonomous driving vehicles through a level 5 control tower. To this end, it employs sensors mounted in the surrounding infrastructure instead of in the vehicle.

Seoul is designing the future of 'mobility'.

Seoul established the 2030 Seoul Urban Master Plan to oversee the transportation sector in Seoul to draw a sketch for the future mobility, and established Autonomous Driving Vision 2030 as detailed plan to create a foundation for fostering the mobility industry in Seoul.

► 2040 Seoul Urban Master Plan

In March 2022, Seoul drew a blueprint for the future of Seoul's transportation. Seoul's 2040 Seoul Urban Master Plan includes the following action plans with the goal of expanding future transportation infrastructure: ① Establish a full-scale operating system for autonomous vehicles; ② Prepare a Seoul-style urban air transport infrastructure tailored to the commercialization of aircraft in 2025 and expand UAM terminals in stages; ③ Create facilities by type according to spatial hierarchy; ④ Complete a three-dimensional transportation city by building a mobility hub throughout Seoul; ⑤ Construct a new logistics network using air-ground-underground.



[Fig. 5] UAM commercialization route (plan)

► Autonomous Driving Vision 2030

Seoul plans to build an autonomous driving infrastructure throughout Seoul by 2026 by investing KRW 148.7 billion over five years from 2022 to 2026. Sangam district, which has been designated as an autonomous driving pilot district and has been the cradle of technology demonstration, will begin full-scale paid operation of autonomous vehicles. Other districts are promoting the commercialization of level 4 robotaxi, and, especially autonomous tourism buses are operated by linking Gyeongbokgung Palace, Changgyeong Palace, Gwangjang Market, and Dongdaemun in the Cheonggyecheon area. In 2023, autonomous buses will start pilot operation on routes from Hongdae to Jonggak, Heunginjimun, and autonomous buses will be settled as a means of public transportation by 2026.⁴⁾

Innovation ground created by Seoul

The Korean government has designated pilot districts to test various autonomous driving services by implementing the autonomous vehicle act in May 2020. As of 2022, Sangam, Gangnam, and Cheonggyecheon are designated as pilot districts in Seoul, providing opportunities for mobility test beds to various companies.



4) Sijung Ilbo (Nov. 25, 2021), Seoul announces autonomous driving vision 2030

▶ Seoul C-ITS Sangam test bed

The Ministry of Land, Infrastructure and Transport created the world's first '5G convergence urban autonomous driving test bed' in Sangam-dong, Seoul, and opened the 'Seoul Future Mobility Center', an autonomous driving control center. The center was built for C-ITS service demonstration, office and technology development, corporate and institutional publicity, and overseas business as well as control. Seoul C-ITS Sangam test bed is equipped with infrastructure such as electric vehicle charger, deep learning detector, traffic signal controller, road side unit (RSU), and control CCTV. Various situations were for demonstration purposes including the mixed city bus section, child protection zone, tunnel, danger section, roundabout section, high-speed driving section, and illegal parking and stopping zone.



[Fig. 6] Seoul C-ITS Sangam test bed

Based on the infrastructure, information is controlled from the autonomous driving test bed situation room, which includes status detection, pedestrian intersection detection, danger zone detection, bus stop congestion/stop/overtaking lane detection, illegal parking detection, tunnel retention detection, etc.

▶ Seoul Gangnam autonomous driving pilot district

The Ministry of Land, Infrastructure and Transport, Seoul, and Hyundai Motors are conducting a level 4 autonomous vehicle pilot operation in the crowded roads of Teheran-ro and Gangnam-daero, Gangnam-gu, Seoul. The autonomous vehicle, 'RoboRide', presented in the test run, is future mobility services combined with autonomous driving technology in collaboration with AI mobility platform company. In particular, autonomous RoboRide is capable of changing lanes, turning left and right, and making U-turns on its own in a situation where pedestrians and large buses are moving in congestion. To this end, the government has prepared a temporary operation permit system so that autonomous vehicles can run on roads and develop technologies.

▶ Seoul's Cheonggyecheon becomes an autonomous driving pilot district.

In 2021, Seoul prepared 'Autonomous Driving Vision 2030' plan and announced the introduction of an autonomous bus in the downtown area of Cheonggyecheon. It introduced and operated two autonomous buses in the 4.8km section of Cheonggyecheon-ro, and announced a plan to establish autonomous driving infrastructure on all roads with two or more lanes in Seoul by 2026. From 2023, autonomous driving routes will be built in the Cheonggyecheon area, and wireless charging technology that does not require manpower from operation to charging will be applied. The charging capacity of the wireless charger installed at the 'Cheonggye Plaza Bus Stop', the turn point of the Cheonggyecheon autonomous bus is designed to be 20 kWh, which is an unmanned charging infrastructure that can run 6 km on a 6-minute charge.



[Fig. 7] Wireless autonomous bus charging system

Seoul creates a mobility culture with companies.

▶ Seoul Startup Hub's support for mobility startup support⁵⁾

Seoul Startup Hub, a representative startup support organization in Seoul, supports promising startups in mobility innovation technology with Mercedes-Benz, a world-class German automobile company. It held 'Expo Day', a performance presentation of a total of 11 startups selected through 'Startup Autobahn', a platform for discovering and nurturing startups with Daimler AG, the parent company of Mercedes-Benz, Germany.

A total of 11 startups announced their commercialization achievements at Expo Day: 'Data King' which developed a certified used car trading system using a metaverse technology; 'Langcode', an AI chatbot-based all-in-one collaboration tool for SW development organizations; 'DoubleMe' that developed a twin world of real world metaverse shared after creating fantasy world in a real space; 'Immersivecast', a next-generation VR solution company leading the VR world; 'Deep Fine,' a special challenge that will

5) Money Today (Dec. 13, 2021) Seoul Startup Hub and Mercedes-Benz selected and supported 11 next-generation mobility startups



change the world through smart glasses; ‘May-I’, a tech start-up which developed image processing artificial intelligence that collects various data from offline space visitors; ‘Linkflow’ that developed and produced the wearable camera itself; ‘Pluxity’, a company specializing in web-based integrated IoT operation platform; ‘Owin’, a connected car service for drivers that connects users and affiliates; ‘VEStellaLab’ which developed AIOT / video-based autonomous driving and indoor parking solution; ‘Bitglim’ that developed a solution to remotely manage cultural and artistic contents on the display.

Seoul Startup Hub plans to promote follow-up support so that 11 startups can develop commercialization technology and succeed in global expansion through close cooperation with Daimler headquarters in Germany even after ‘Expo Day’.



[Fig. 8] Photos of Seoul Startup Hub

► Support for safe transportation settlement of personal mobility ⁶⁾

In addition to vehicle sector, Seoul makes an effort to promote shared personal mobility (micro mobility) and establish a healthy and safe mobility culture.

Recently, as personal mobility such as electric scooters has emerged as an eco-friendly and future-oriented sustainable means of transportation, their use is rapidly increasing.

Thanks to good connection with public transportation, they are positioned as a short- distance transportation method that plays the role of ‘First-Last 1mile’. Seoul has signed an MOU with 16 shared personal mobility companies to establish an order of use and promote use so that personal mobility can be settled as a safe means of transportation.

Shared personal mobility in Seoul has increased from 150 units in 2018 to 35,850 units in 2020 and is expected to continue to increase in the future. In particular, since they are allowed to pass on bicycle paths and roadside areas and the number of users has increased as an environment where minors can also use is also provided according to the amendment of Road Traffic Act, a cooperative system has been established to support healthy industrial growth.

Seoul and 25 autonomous districts has prepared a plan to establish and revitalize the personal mobility order with the shared personal mobility industry. Thus, the signed MOU contains the following specific action plan: ① Set guidelines

for improving personal mobility parking order; ② Prepare a ‘user device return management system’ for correct parking for users; ③ Prepare ‘internal complaint management system’ for expedited response to complaints such as neglect of equipment; ④ Protect users’ rights and interests through mandatory insurance for shared personal mobility companies; ⑤ Promote utilization through expansion and maintenance of personal mobility facilities such as bicycle roads.

Through this, Seoul will change from a vehicle- oriented transportation system to a pedestrian- oriented transportation system, providing a pleasant and safe walking space for Seoul citizens, and at the same time promoting the revitalization of various transportation means and industries.

See future mobility through Seoul.

The Seoul Mobility Show has been held every odd-numbered year since 1995. Until 2019, it was held under the name of the Seoul Motor Show, but in 2021 it was upgraded to the Seoul Mobility Show. At the first Seoul Motor Show in 1995, only 204 companies from 7 countries participated. In 2002, the number increased to 192 companies from 11 countries, and in 2019, at the last motor show, it expanded to a scale that 227 companies participated.

At the Seoul Motor Show, exhibitions were focused on passenger cars and commercial vehicles, automotive material parts and supplies, and eco-friendly energy; however, at the Seoul Mobility Show in 2023, the future of mobility will be exhibited not only on vehicles, but also on air mobility, personal mobility, railway and ship and robot mobility under the theme of Sustainable, Connected, and Mobility. In the section of technology and service-oriented software, companies related to vehicle sharing, O2O, last mile, integrated transportation service, autonomous driving, and mobility convergence technology will participate. Besides, additional events will be held to provide opportunities to discover and develop new technologies, share the latest trends, and experience, which include Seoul mobility awards, future mobility-related forums and seminars, mobility test drive events, industry-university-related programs, etc.



[Fig.9] Opening Ceremony of Seoul Mobility Show 2021

6) Seoul Metropolitan Government (Sept. 24, 2020), Seoul signed MOUs with 16 shared personal mobility companies to establish and revitalize the use order

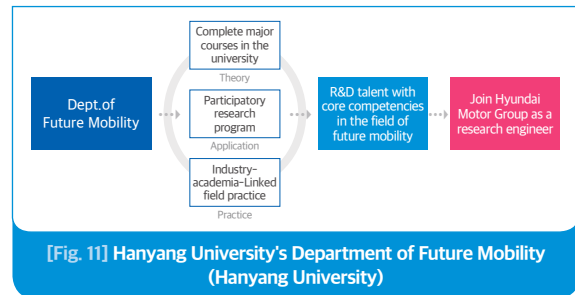
Mobility brain led by universities and companies



In addition to companies, Seoul is nurturing highly competent talents who can lead future mobility Korea, and can be immediately put into the industrial field, through industry- academy-research cooperation with leading universities representing Korea.

Korea University opened the Department of Smart Mobility, an integrated bachelor's and master's course as a contract course, to nurture talents who will lead the future mobility industry such as hydrogen and robotics together with Hyundai Motors. The Department of Smart Mobility is a specialized curriculum in which Hyundai Motor's customized teaching and learning systems are applied, and it focuses on nurturing specialized talents in two fields, hydrogen and robotics, which are the core of Hyundai Motors. The curriculum was jointly developed by Korea University and Hyundai Motors with the goal of nurturing practical talents who can be immediately put into R&D work without job training after graduation, and researchers from Hyundai Motors participate as adjunct professors. Students are provided with full scholarships for 5 years of the integrated course, and given opportunities such as participation in industry-related academic programs, presentations at conferences, field trips to overseas research institutes, on-the-job mentoring, etc. After graduation, they are guaranteed to join Hyundai Motors, and grants are also being considered for the best talents in each major field when they go on to a doctoral program at an overseas university.⁷⁾

Hanyang University is running a master's program in the Department of Automotive Electronic Control Engineering as a contract department of Hyundai Motor Group. It aims to foster excellent human resources with both theory and practice through customized education programs on optimized automotive electronic control, and nurture competitive, high-level human resources in the automotive electronic control field through the implementation of an employment linkage program with Hyundai Motor Group. Students are provided with full scholarships and research grants and will join Hyundai Motor Group after graduating from the master's program.⁸⁾



[Fig. 11] Hanyang University's Department of Future Mobility (Hanyang University)

Seoul National University is running the graduate program of Smart Ocean Mobility, which provides a wide range of opportunities to learn the knowledge and insights of experts in academia and industry through seminars style lectures by renowned professors at Seoul National University and by executives of Hyundai Heavy Industries Group. Various industry-academic programs such as AI forums and technology contests are also included. All students who complete this program will receive a scholarship equivalent to tuition, and additional points will be given when applying for a job at Hyundai Heavy Industries Group.⁹⁾



[Fig. 10] Signing ceremony between Korea University and Hyundai Motors (Hyundai Motor Group)



[Fig. 12] Global R&D Center (Hyundai Motor Group)

7) Hyundai Motors (May 26, 2022), Hyundai Motors establishes Department of Smart Mobility as a contract department with Korea University.

8) Hanyang University (May 2014) Establishment of a contract department of Hyundai Motor Group

9) New Daily Economy (Sept. 1, 2022), Hyundai Heavy Industries Group and Seoul National University open the Smart Ocean Mobility as a graduate program

Seoul Mobility Innovator, the center of innovation

Seoul National University's Future Mobility Technology Center (FMTC) is one of the best autonomous vehicle research centers in Korea established by Seoul National University for the purpose of creating an autonomous driving-based future smart mobility city environment and researching related technologies, systems, and laws.

FMTC is creating synergy and creating a future mobility innovation ecosystem through cooperation with various companies as well as its own R&D. In June 2020, FMTC developed vehicle software platform and operating system technology with Daegu Gyeongbuk Institute of Science and Technology (DGIST), and signed an MOU for joint cooperation with DrimAES, which was established in 2015 with the capital investment from Dreamlab.

In preparation for the commercialization of autonomous vehicles, these two organizations jointly research the embedded systemization of Vehicle Information Platform, Advanced Driver Assistance System (ADAS), and autonomous driving platform. In 2021, it signed a business agreement with Jin Mobility (I.M Taxi) on mobility R&D.

In preparation for the commercialization of autonomous vehicles, these two organizations promote cooperation on legal and institutional activities to strengthen autonomous driving capabilities as well as secure the right to operate autonomous driving business for paid transportation license holders.

Besides, by providing an autonomous driving test track owned by Seoul National University in 2022, it supported WemeetMobility to design an autonomous vehicle's shortest route planning algorithm and to conduct efficiency studies through the introduction of optimization algorithms.



[Fig. 13] Seoul National University's Future Mobility Research Building and autonomous driving test track

Korea Automotive Technology Institute is located in Siheung, adjacent to Seoul as connected by subway. It supports fostering of the automobile industry in Seoul and the metropolitan area in such areas as development and test certification of eco-friendly automobile parts, manufacturing technology research on casting and mold technology, etc.; product performance evaluation, quality analysis, reverse engineering, prototyping.

It is promoting system industrial technology development infrastructure construction project, machinery industry core technology development project, industrial commerce cooperation development support project, automobile industry core technology development project, and robot industry core technology development project. In particular, the automobile industry core technology development project uses 3D printing to target the Waste Gate valve Turbocharger (WGT) module of the 2-liter gasoline engine, which is a core part of eco-friendly automobiles, to develop a turbocharger part with equivalent performance that satisfies the performance within 5% of the existing part. The system industrial technology development infrastructure construction project promotes strengthening the international competitiveness of small and medium-sized automobile safety parts makers and establishing a foundation to support one-stop services from production to performance evaluation and international certification.

The machinery industry core technology development project develops equipment and demonstration technology to enhance the performance and safety verification capabilities of pressure control device manufacturers that are commonly applied to all fields of the hydrogen industry. The robot industry core technology development project is promoting the development of manufacturing robot process technology that can support the smooth application and operation of manufacturing robots in the field of small and medium-sized parts companies in the domestic automobile sector.



[Fig. 14] Korea Automotive Technology Institute (Gyeonggi Headquarters)

Efforts for a sustainable Seoul mobility industry

Seoul Metropolitan Council's ESG practice

Seoul Metropolitan Council has signed an MOU with HUMAX Mobility and uses 'Carplat Biz', an eco-friendly car sharing service for business.

The Seoul Metropolitan Council established a special committee for '2050 carbon neutrality and just transition', and is promoting specific policies to overcome global warming and climate crisis and practice carbon neutrality.

As part of the implementation of these policies, the Seoul Metropolitan Council is supporting the establishment of an eco-friendly mobility ecosystem to reduce automobile exhaust pollution. As a self-participation and action plan of the council, an eco-friendly car-sharing service was introduced.

'Carplat Biz' is HUMAX Mobility's eco-friendly company car-sharing service, which is an electric vehicle-based business car sharing service for employees of public institutions and corporations. The company's executives and employees can use it only as much as they want, when they need it. In addition, it supports mobile app smart key to provide services with high efficiency and convenience.

Seoul Mobility ESG with Citizen Participation



Seoul has signed an 'MOU with Hyundai Motor Group for mutual cooperation to revitalize driving mileage system and eco-friendly ecosystems'. Through this agreement, Hyundai Motor Group will use the 'data hub' service based on connected car technology to improve and support the convenience of the passenger car mileage system together with Seoul.

Driving Mileage System is a voluntary participation program for citizens introduced by Seoul in 2017 to reduce fine dust and greenhouse gases, where mileage of KRW 70,000 is provided per year after checking the car's mileage reduced by one year. Mileage can be used to purchase mobile gift certificates, pay taxes, convert cash, and donate.

The current driving mileage system had the inconvenience of recording the mileage for the first time and taking a picture of the vehicle dashboard. However, by linking the system through the MOU, it is possible to check mileage reduction and apply for mileage accumulation with a simple operation on the mobile app. As a result, the convenience of citizens is further improved and more citizens are expected to participate.



Innovative master of autonomous driving,


Han-bin Lee, CEO of Seoul Robotics

Q. Please introduce Seoul Robotics.

A. Seoul Robotics is a start-up company that realizes infrastructure-based autonomous driving technology and services since established in 2017. We are cooperating with global companies such as Mercedes-Benz, Volvo, and Qualcomm, focusing on computer vision and computer vision technology for 3D sensors. In addition, Seoul Robotics is the only Korean start-up registered as a member of the German Automobile Industry, which proves our solid technology and global competitiveness.

Q. How is the collaboration with the Seoul Metropolitan Government?

A. Seoul Robotics has collaborated with BMW on infrastructure-based autonomous driving since 2019, and has partially completed commercialization. Demonstration of the commercialized technology was conducted in a suburb of Seoul. The infrastructure-based autonomous driving system should demonstrate the capability of autonomous driving for vehicles without autonomous driving function. For this technical test, the suburb of Seoul, which was not far from the company, were suitable as they provided an environment with sufficient space, road network, and adequate congestion.



Han-bin Lee, CEO

- Graduated from the Pennsylvania State University
- CEO of Seoul Robotics. 2017-present

Q. What is the subject of infrastructure-based autonomous driving service?

A. Currently, infrastructure-based autonomous driving is being conducted as a B2B business targeting factory logistics complexes and large parking facilities. We saw opportunities in parking and vehicle movement requirements and valet parking services in large infrastructure facilities. Although this is currently being applied to the transportation system of a limited area such as a logistics complex; we expect it to be gradually expanded to B2G projects such as Dong units or Gu units in Seoul in the future.

Q. What are Seoul Robotics's future business plans or goals?

A. As I said, in the future, Seoul Robotics wants to create opportunities to provide more convenient and safe transportation services not only for our business but also for Seoul and the entire Korea by carrying out projects in collaboration with Seoul and local governments. And, of course, we hope that Seoul Robotics can become a good example of a Korean startup in global business.

People who shape Mobility City Seoul

Hyundai Motors guides citizens' feet to the future through the promising startup, 42dot

Min-kyu Kim,
Head of Mobility Service Platform Group



Q. Please introduce 42dot-Hyundai Motor Group.

A. As a mobility startup, 42dot originally conducted research and development projects related to various software technologies and mobility services, including technologies related to autonomous driving with a focus on services for users from 2019. It technically does not use LiDAR, but differentiates itself by using cameras and radar. On August 12, 2022, 42dot became one with Hyundai Motor Group, and autonomous driving service technology and services are being developed as Hyundai Motor Group's Global Software Center since then.

Q. Please tell us about the project you are working on in Seoul.

A. In 2021, Seoul promoted an autonomous driving service project where any Korean citizens or foreigners having alien registration cards can ride without any restrictions. Usually, as various autonomous driving operators participate in the project, and each company provides their autonomous driving calling app, citizens have to download multiple apps and this causes inconveniences. To avoid these inconveniences, Seoul recruited an operator for autonomous driving calls separately at the beginning of the project, and we took over the project.

Q. What are the future plans of Hyundai Motor Group-42dot?

A. After acquiring 42dot, in October 2022, Hyundai Motor Group announced the establishment of a Global Software Center. The Global Software Center plans to take on new challenges centering on 42dot. It will develop software-oriented mobility devices and solutions so that Hyundai Motor Group can enter the future mobility and logistics market in earnest. In the long term, we plan to develop software-centric mobility that understands customer intentions and contexts based on massive mobility data and AI technology. Furthermore, we plan to develop a technology that connects mobility devices to each other under one city operating system and create an ecosystem capable of autonomous driving.

Q. What will be the role of Seoul in the future mobility industry?

A. Hyundai Motor Group's Global Software Center is now conducting actual services for Seoul citizens, rather than autonomous driving for R&D or demonstration. Instead of focusing on experiences, we are advancing technologies and services to change our lives. Seoul is already preparing for sustainable future mobility with the 2040 Seoul Urban Master Plan and we are also developing services accordingly. These efforts by the private sector are important, but I think the will and policy direction of local governments like Seoul are very important. In particular, collaboration with Seoul is expected to serve as a good reference for the development of mobility companies and industries in the future.



The cradle of fostering innovative mobility talents

**Professor Kun-soo Huh,
Department of Future Mobility, Hanyang
University**

Q. Please introduce the Department of Future Mobility and the Graduate School of Future Mobility at Hanyang University.

A. Hanyang University has recognized the need to nurture convergence talents in the field of future automobiles, and is leading the way in opening and operating a convergence curriculum. The Department of Future Mobility in the undergraduate school, was opened in 2010 with the goal of fostering global creative talents in the field of eco-friendly vehicles and autonomous vehicles. The Graduate School of Future Mobility is an employment-guaranteed contract program with Hyundai Motor Group, where convergence education and research are being conducted in various laboratories in the fields of machinery, electricity, electronics, and software.

Q. What role do universities play in the mobility industry?

A. We can say that universities are in charge of education and research on mobility means including automobiles, buses, taxis, and bicycles in mechanical, electrical, electronic, and SW-related departments. In addition, transportation and civil engineering departments are conducting education and research on mobility systems related to infrastructure and transportation system construction, and companies such as startups are trying to innovate platforms such as riding hailing and car sharing services.



Professor Kunsoo Huh

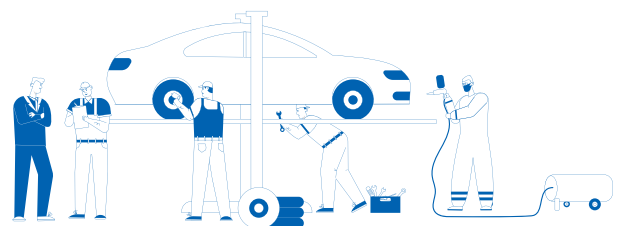
- Vice President, KASE, 2015-2017
- Head of 19th Future Growth Engine Smart Vehicle Promotion Team, 2016-2017
- Head of Innovative Growth Engine Autonomous Vehicle Promotion Team, MSICT, 2017-2020
- Professor of the Department of Future Mobility, College of Engineering, Hanyang University, 2019-present
- Chairman of Autonomous Driving Standardization Forum Steering Committee, KATS, 2019-present

Q. What are the career paths of students after studying at university?

A. Graduates from related universities are advancing into various companies in each field of mobility. Graduates of Hanyang University's Department of Future Mobility mainly find jobs in large companies such as automobile companies and parts makers, Samsung and LG, and recently, there are quite a few cases of employment in startups such as Code42 and Autonomous A2Z.

Q. What is the role of Seoul for the future development of the mobility industry?

A. The mobility system requires a lot of the roles of the Seoul Metropolitan Government. In addition, it is necessary to think about the reasonable improvement of traffic and road systems for the future. I think now is the time to think about the improvement of road infrastructure and transportation methods for the efficient flow of vehicles, buses, motorcycles, and bicycles on the roads in Seoul.



People who shape Mobility City Seoul

The innovator of the future of mobility

Jun-hyeong Lee,
a student in the Graduate School of Future
Mobility at Hanyang University,

Q. Which field of mobility are you interested in?

A. While I was usually interested in autonomous driving services, traffic-related issues emerged, such as the strengthening of laws related to drunk driving and the increase in accidents by elderly drivers due to aging. I thought that advanced autonomous driving technology and services were important to solve these problems. In particular, I am interested in mass-producing autonomous driving technology of Level 3 or higher with minimal driver's intervention in the near future.

Q. Please introduce your research lab or project you are participating in at the graduate school.

A. Currently, I am affiliated with the Signal Processing Artificial Intelligence Lab at Hanyang University, researching autonomous driving recognition technology based on cameras and LiDAR sensors. Especially, I've been researching the deep learning technology required to perform LiDAR sensor-based 3D object detection and are participating in related projects.

Jun-hyeong Lee

- Graduated from Bachelor's course in electrical engineering, College of Engineering, Konkuk University, 2021
- Master's course in Department of Future Mobility, College of Engineering, Hanyang University, 2021-present

Q. What companies and technologies are you interested in the field of mobility?

A. I am interested in Seoul Robotics, which develops environmental recognition technology based on LiDAR sensors. I think it is one of the startups leading the advanced technology in the field of mobility as it shows the trend to expand business areas to smart logistics systems, autonomous parking systems, etc. by developing technologies related to infrastructure-based autonomous driving services as well as cognitive technologies required for autonomous vehicles.

Q. From the perspective of a future talent, what are your expectations for Seoul for the development of the mobility industry?

A. I hope that there will be more opportunities for undergraduate and graduate students to directly participate in competitions and academic conferences related to the field of mobility. I believe that more students will become interested in the field of mobility and set their careers in related fields if they have the opportunity to learn about topics that are difficult to deal with in the theoretical and practical environment on campus.

Invest Seoul is with You

The Goal of Invest Seoul is the Successful Business of Foreign Investors.

Invest Seoul is a foreign investment promotion agency in Seoul, which provides a step-by-step support program optimized for the needs of foreign investors in cooperation with industry-specific organizations, private experts in each field, and the central government based on rich knowledge and diverse experiences related to foreign investment.¹⁰⁾

Investment Incentives

Cash Grants

In relation to high technology and advanced product business, the following expense may be supported: purchase cost of land or buildings for new installation or expansion of factories (or a place of business); rent or construction cost of research facilities; purchase cost of capital goods and research equipment; installation cost of infrastructure, employment subsidy and education and training subsidy. Eligibility for application is foreign investment through the acquisition of new shares, with a foreign investment ratio of 30% or more, and new/expansion of factories, a places of business, or R&D facilities.

Tax Exemption

Foreign investors who build new factories or places of business or invest US\$ 2 million or more may receive reduction in acquisition and property taxes on real estate, and exemption from customs duties, individual consumption tax, and value added tax.

Employment Subsidy and Education and Training Subsidy

Employment subsidies and education and training subsidies are provided to foreign-invested companies in Seoul's new growth engine industry including Finance, Business Services, IT Convergence, Green Industry, Biomedical, Digital Content Business, Fashion Design, Tourism Convention Business, and companies directly attracting from Seoul through an MOU of Seoul Foreign Investment Attraction Project.

Occupancy Space for Foreign-Invested Companies

Seoul provides the operating centers as a lease places for foreign-invested companies

<Table 1> Support for Occupancy Space for Foreign-Invested Companies

Spaces	Eligible Industry Sectors
High Tech Industry Center	<ul style="list-style-type: none"> Digital media industry including broadcasting and film Digital content industry including video games and animations Smart media, autonomous driving DMC strategic industries Industries generating significant synergy with digital industries, such as IT and design
Industry-Academy Cooperation Research Center	<ul style="list-style-type: none"> Digital media industry including broadcasting and film Digital content industry including video games and animations Smart media, autonomous driving DMC strategic industries Industries generating significant synergy with digital industries, such as IT and design Foreign research institutes conducting joint research with a university, or a university research institute located in Seoul

Occupancy Space for Foreign-Invested Companies

Invest Seoul is supporting CORE 100 to find promising investment companies located in Seoul.

In addition, it operates an all-in-one package consisting of investment support, management support, and settlement support for global companies to advance into Seoul.

<Table 2> All-in-one Package

Category	Description
Investment Support	<ul style="list-style-type: none"> Legal support for registration related to incorporation or increase of capital - Subsidy corresponding to the actual cost of legal expenses depending on the amount of the investment
Management Support	<ul style="list-style-type: none"> Support for consulting on labor/recruitment, legal, tax/accounting, and intellectual property rights - Subsidy equivalent to 1% of FDI investment
Settlement Support	<ul style="list-style-type: none"> Support for office rent and relocation service fee - Up to 5 million KRW will be paid to companies with FDI of 1 billion KRW or more

Directions

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2022 Seoul Industry Report

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