



Seoul,
the Growth Hub of
Korea's **Robot** Industry



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Seoul is taking a leap toward becoming a global leader in the robot market. The size of the global robot market has grown steadily at an average annual rate of 9% over the past five years, reaching 35 trillion KRW (24.3 billion dollars) in 2020. The Korean robot market has also grown by 5% over the past five years, and its size reached about 5.5 trillion KRW (\$3.8 billion) in 2020, accounting for 12% of the global market share. In particular, the robot market in Seoul (including the metropolitan area) is worth 3.1 trillion KRW (\$2.17

billion), accounting for 56% of the total Korean market. For example, the size of the personal service robot market in Seoul accounts for 89% of the Korean market, which is on the same line with the trend that the global average annual growth rate (10%) of the service robot market is rapidly increasing compared to the growth rate of the industrial robot market.

Many conglomerates located in Seoul have recently selected the robot industry as a new engine for future growth and are actively promoting robot development. This means that the size of the robot market in Seoul is expected to expand further in the future. For example, leading global companies such as Hyundai Motor Group, LG Electronics, and Samsung Electronics are developing and introducing a variety of robots by greatly increasing their investment and forming a dedicated team for robots as one of the pillars of their future business. Besides, innovative startups based on robotics technology are growing in Seoul in the fields of industrial robots, professional service robots, personal service robots, and robot parts and software.

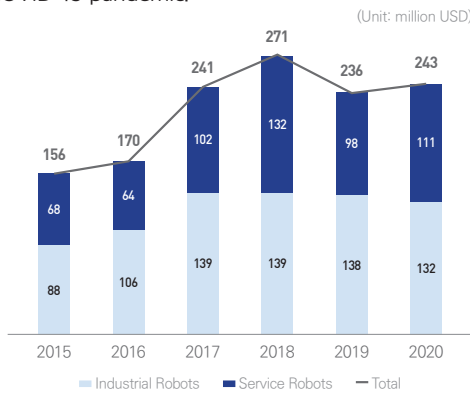


Seoul is the best city for the robot industry. In particular, for the service robot market, since Seoul is a place where a large number of citizens and companies coexist, robot companies can smoothly conduct B2C for consumers and B2B for service companies, maximizing the market creation potential. In addition, for the development of the robot industry, advanced new technologies and infrastructure that can be fused with robot technologies should be supported. As a city where various industrial and technology-based clusters such as artificial intelligence, ICT, and bio industries are concentrated in Yangjae, Magok, Hongneung, etc., Seoul is not only expected to benefit from collaboration between industries, but also has the optimal conditions for robot companies to grow.



The global robot market is growing steadily, centering on service robots.

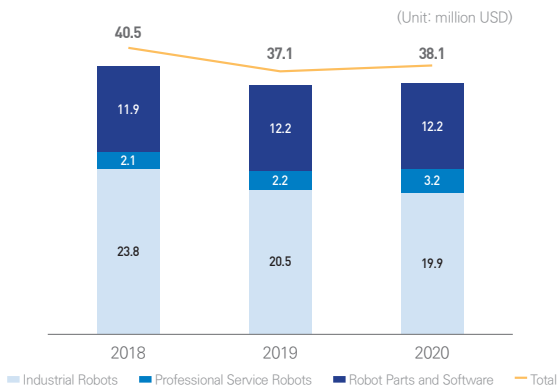
The global robot market was worth \$24.3 billion (35 trillion KRW) as of 2020, and grew at an average annual rate of 9% for five years from 2015 to 2020. In detail, the industrial robot market size was \$13.2 billion (18.9 trillion KRW), and the service robot market size was 11.1 billion dollars (15.9 trillion KRW). However, as the average annual growth rate of the service robot market was 10%, and the average annual growth rate of the industrial robot market was 8%, the growth rate and scale of the service robot market gradually surpassed that of the existing industrial robot market in a the COVID-19 pandemic.¹⁾



[Fig. 1] Global Robot Market

South Korea, the country with the highest robot density in the world

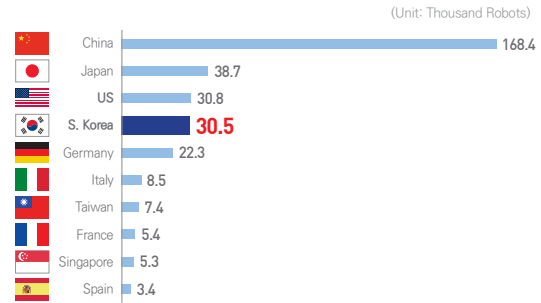
The Korean robot market is the fifth largest in the world with a size of \$3.81 billion (5.5 trillion KRW) as of 2020.²⁾ It has been growing at an average annual rate of 5.4% for five years from 2015 to 2020. In detail, the industrial robot market is the largest at US\$1.99 billion (2.9 trillion KRW), followed by the service robot market at US\$320 million (0.5 trillion KRW) and the robot parts market at US\$1.22 billion (1.8 trillion KRW). As for the average annual growth rate, the robot parts market is showing the fastest growth at 11.7%.³⁾



[Fig. 2] Status of the Korean Robot Market

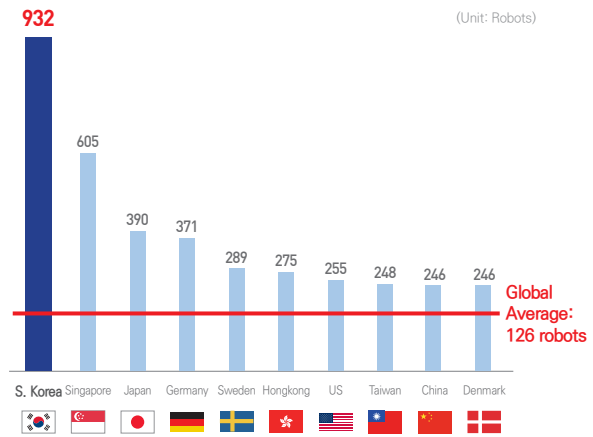
In particular, Korea's industrial robot market is the fifth largest in the world, accounting for about 6% after China, the United States, Japan, and Germany.

The annual installation of industrial robots is also the fourth largest after Japan, China and the United States with 30,500 units⁴⁾ This is because the supply of industrial robots is active to Korea's main industries such as automobiles, semiconductors, LCDs, and electronics/electrical industries. That's why global robot companies are worth entering the high-demand Korean market.



[Fig. 3] Number of Installed Industrial Robots by Country, 2020

average (126), accounting for the highest robot adoption rate in the world. Korea has ranked first in the adoption rate of industrial robots for eight consecutive years since 2010, which means that the use of industrial robots has accelerated and the demand is increasing despite the pandemic.



[Fig. 4] Number of Robots per 10,000 Workers, 2020

The size of the service robot market in Korea recorded \$630 million (0.9 trillion KRW), an increase of 34.9% compared to 2019, due to the increase in sales of robot vacuum cleaners and surgical robots. Among the 458 Korean companies leading the service robot industry, the conglomerates with sales of more than 50 billion KRW are LG Electronics and Samsung Electronics located in Seoul (including the metropolitan area).

1) International Federation of Robotics (IFR) (2021), World Robotics 2021
 2) IBK Securities (2022.27), IBKS Collabo Report Mr. Robot
 3) Ministry of Trade, Industry and Energy (Dec. 2021), Robot Industry Survey 2020

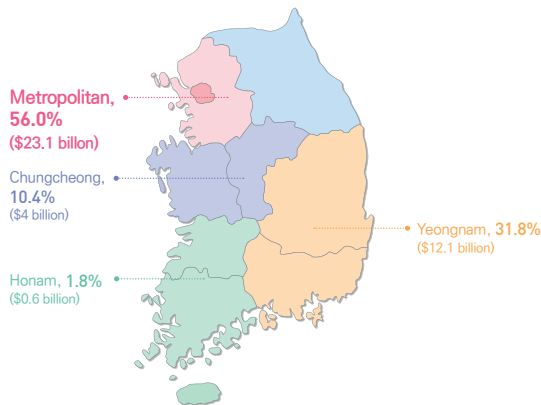
4) International Federation of Robotics (IFR) (Oct. 28, 2021), IFR presents World Robotics 2021 reports

● ● ● 1. Seoul moves the global robot market.

Behind the growth of the Korean robot market is the Korean government's active promotion of related policies. After enforcing 'the Intelligent Robot Act' in 2008, the Korean government established the Intelligent Robot Master Plans over 2009, 2014, and 2019 to foster the industry. The government-led initiatives include dissemination of manufacturing robots for process improvement of small and medium-sized manufacturing companies, creation of an initial market for service robots, and R&D of core robot technologies. In addition, the Korean government announced 'the Robot Industry Preemptive Regulatory Innovation Roadmap' in 2020 and launched the Robot Industry Regulatory Improvement Private Consultative Group in June 2022. Based on these, the government announced a plan to establish 'the Robot Industry Preemptive Regulatory Innovation Roadmap 2.0' in the second half of the year to actively support the revitalization of the robot industry led by the private sector.⁵⁾

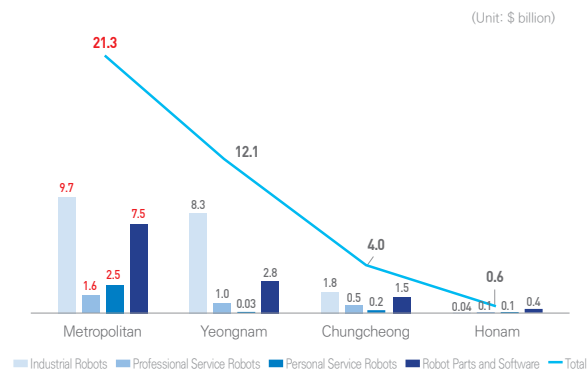
Seoul leads the Korean robot market, the 5th largest in the world.

As of 2020, the size of the robot market in Seoul and the metropolitan area where the representative companies of the Korean service robot market are located, is \$2.13 billion (3.1 trillion KRW), accounting for 56% of the Korean robot market.



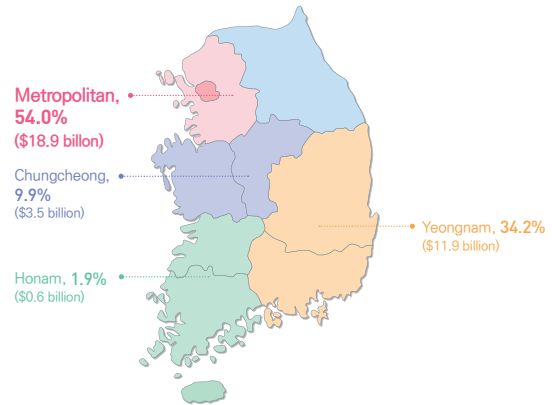
[Fig. 5] Sales Share of Robot Market by Region, 2020

In particular, the sales of robots for personal service in Seoul (including the metropolitan area) amounted to \$250 million (0.4 trillion KRW), accounting for 89% of the Korean market, and this means that Seoul has a very large portion in the service robot market.



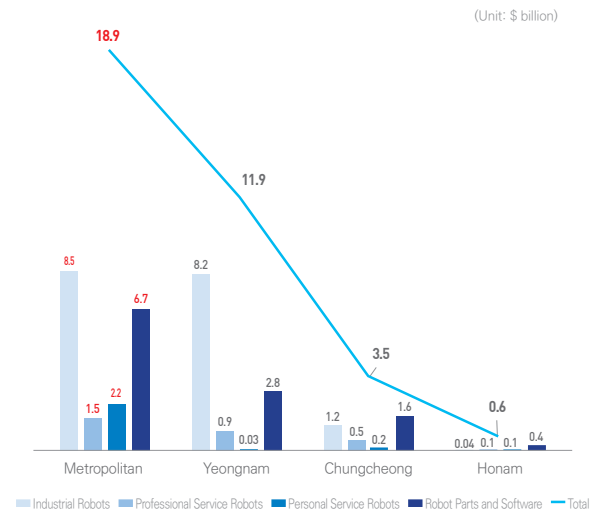
[Fig. 6] Robot Market Sales by Region and Industry, 2020

As of 2020, robot production in Seoul (including the metropolitan area) was \$1.89 billion (2.7 trillion KRW), accounting for 54% of Korea's robot production.



[Fig. 7] Proportion of Robot Market Production by Region, 2020

In particular, the production amount of robots for personal service in Seoul (including the metropolitan area) is 220 million dollars (0.3 trillion KRW), accounting for 88% of the Korean market. This indicates that Seoul (including the metropolitan area) is dominating the service robot market, just like in sales.⁶⁾



[Fig. 8] Robot Market Production by Region and Industry, 2020

As such, Seoul, located in Korea which has a 12% share of the global robot market, has a special strength in the service robot market, and this is very advantageous for targeting the service robot market, which is on the way to growth worldwide.

5) Electronic Times (March 14, 2022), K-Robot in the Age of With Robots,

6) Ministry of Trade, Industry and Energy (Dec. 2021), Robot Industry Survey 2020

Robots are being used not only in manufacturing smart factories, but also in food serving, delivery, medical services such as surgery and rehabilitation, and guidance, security, and guards. In addition, with the recent increase in automation and non-face-to-face trends due to the COVID-19 pandemic, the With Robot era has been advanced. In this great transition period, it is necessary to examine the current status of Seoul-based robot companies and their future prospects in order to take a leap forward as a robot-friendly global capital. Accordingly, we looked at the companies operating in the robot industry by dividing them into conglomerates and start-up companies.

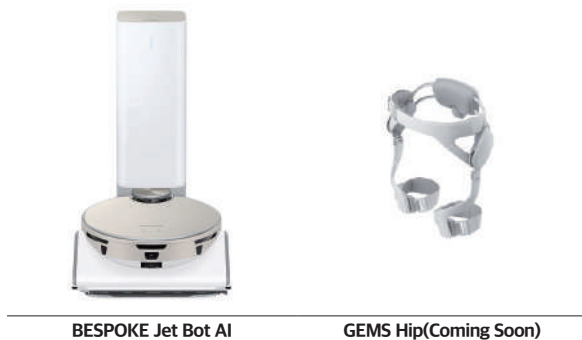
Korean conglomerates focus on investing in the next-generation new industrial robot business

Korean conglomerates located in Seoul has recognized the robot market as a new engine for future growth, entered the business in earnest and made active investments.



The Samsung Group announced that it would make a new investment of 240 trillion KRW in 2021 in strategic fields such as robots, semiconductors, biotechnology, and artificial intelligence, in December of the same year, Samsung Group promoted the Robot Commercialization TF Team to the Robot Business Team. Samsung Electronics is developing a housekeeping robot Samsung 'Bot Handy', an interaction robot Samsung 'Bot Eye', an AI avatar food serving robot Samsung 'Bot Serving', a customer service robot Samsung 'Bot Guide', and a walking assistance robot 'GEMS(Gait Enhancing and Motivating System)'. In particular, GEMS is scheduled to be released in the second half of 2022 and has been reported to the US Food and Drug Administration. In addition, by launching Samsung 'BESPOKE Jet Bot', a robot vacuum cleaner, Samsung Electronics is also actively investing and marketing in the home service robot market.⁷⁾

From Samsung Electronics website



BESPOKE Jet Bot AI

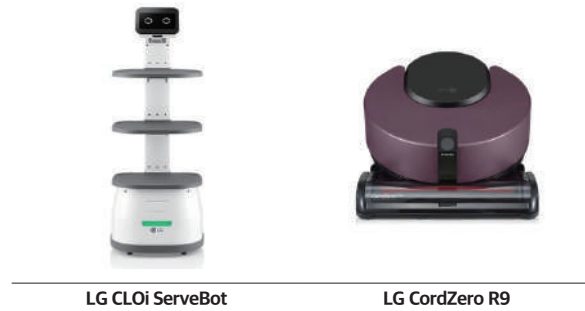
GEMS Hip(Coming Soon)

7) The Macil Ilbo (Aug. 31, 2022), Samsung and LG robots selected as a new engine for future growth



LG Electronics, located in Yeongdeungpo-gu, Seoul, has been developing robots in various fields from industrial to service by entering the robot market as a future industry to replace the mobile phone business terminated in 2021. In particular, it launched service robots in seven fields, including serving, guidance, and delivery robots, like the guide robot at Incheon International Airport. LG Electronics started to enter the robot market by acquiring Angel Robotics, a wearable company located in Seoul, in 2017, and in 2018, invested in industrial robot manufacturers including Robotis and BossaNova Robotics. In addition, it established the LG Boston Robotics Lab in Boston, USA in 2020 to strengthen its technological competitiveness through cooperation with MIT.⁸⁾ Besides, the robot vacuum cleaners 'CordZero Roboking', 'CordZero R9' (vacuum only) and 'CordZero M9' (wet mop) launched in 2003 are responding to the increasing demand for robot cleaners.

From LG Electronics website



LG CLOi ServeBot

LG CordZero R9



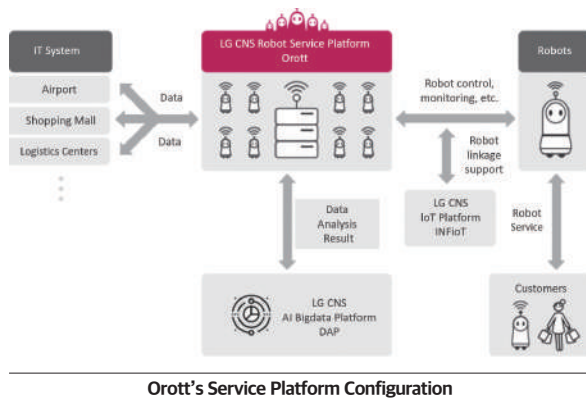
In 2018, LG CNS, an IT service provider located in Gangseo-gu, Seoul, launched seven major brands upgraded from the existing IT service industry to respond to the 4th industrial revolution. One of the seven major brands is 'Robot Service (robot software)', and LG CNS launched 'Orott', a robot service platform for the first time in the IT service industry. Orott is a platform that integrates, operates and manages service robots by connecting IT systems of shopping malls, airports, and logistics centers with robots for security, information, and cleaning. LG CNS applies Orott to 'AIRSTAR' a guide robot for Incheon International Airport developed by LG Electronics, and controls 14 guide robots in connection with the airport IT system, which enhances airport user convenience.⁹⁾

8) ZDNET Korea (Jan. 15, 2020), LG Electronics established LG Boston Robotics Lab.

9) LG CNS official website, blog

● ● ● 2. Seoul moves forward as a global robotics capital

From LG CNC website



HYUNDAI

MOTOR GROUP

The **Hyundai Motor Group**, located in Seocho-gu, Seoul, is promoting a plan to lead the market by focusing on robots, urban air mobility (UAM), smart city, and hydrogen vision to transform an existing automobile manufacturer into a smart mobility solution company. In particular, it is concentrating on **R&D with a focus on robotics (robot + techniques) as a future growth engine**. In 2018, Hyundai Motors started developing robots in earnest by establishing the **Robotics Team**, an organization dedicated to the field of robots. In December 2020, it acquired an **80% stake in Boston Dynamics**, a global robot company, and completed an M&A in June 2021 to actively invest in robotics technology.¹⁰⁾ Boston Dynamics is a company with world-class technologies in autonomous driving (walking), perception, and control. At **Consumer Electronics Show (CES) 2022**, Hyundai Motor Company introduced the concepts from **MoT (Mobility of Things) to MetaMobility** and showcased cutting-edge robotics technology, which forms the core of Hyundai Motor Company, including Plug and Drive Module, (PnD Module), and Drive and Lift Module (DnL Module). In addition, it has launched a service robot, 'DAL-e', which can be used in customer service fields with a lower weight compared to existing robots. DAL-e is currently in trial service.¹¹⁾

From Hyundai Motor Group website



10) The Korea Economic Daily (June 7, 2022), Hyundai Motors developed new concept mobility and intelligent robots as robotics, a future growth engine.

11) HeadlineNews (Jan. 5, 2022) Hyundai Motors unveils cutting-edge robotics such as FnD module, DnL module, Spot, Atlas, etc.



SK Telecom, a telecommunication company located in Jung-gu, Seoul, has made a new investment of **10 billion KRW in CMES**, an artificial intelligence robotics software development startup located in Seoul, and signed a cooperative business agreement to **advance into the AI robot business in the logistics field**, accelerating the robot business centered on logistics specialized services. Based on collaboration with CMES, which is developing robots in various industries based on artificial intelligence and 3D machine vision technology, it has developed AI logistics palletizing robots that sort atypical goods in 2020, and further, **planning to enter the world's largest logistics market in the United States through the development of AI robot business cooperation business model with CMES**. In addition, paying attention to the growth of the service robot market, in 2021, SK Telecom launched Keemi, a quarantine service robot based on 5G and real-time location system (RTLS), which have been applied to the operation of the 24-hour infection control system at Yongin Severance Hospital.¹²⁾

From SK Telecom website



Quarantine Robot, Keemi



LG Uplus, a telecommunication company located in Yongsan-gu, Seoul, has confirmed the potential of the robot business by introducing robots in the fields of 5G network-based autonomous drug delivery, smart factories, and air environment management, and has been **promoting the service robot business in earnest with LG Electronics**. After signing a partnership with The Born Korea, LG Uplus is piloting the serving robot 'LG CLOi Subbot', and plans to expand it to franchise stores.¹³⁾

12) ZDNET Korea (April 6, 2022), SKT robot combined with 5G and AI, applied to logistics field

13) MT Times (Sept. 22, 2022), LG Uplus promotes service robot business with LG Electronics

From LG Uplus website



LG Uplus U+ Drug Delivery Robot



One of them is **Neuromeka**, a specialized industrial robot company established in Seongdong-gu, Seoul in 2013.

Neuromeka is leading the automation of manufacturing SMEs by supplying **low-cost, easy-to-use collaborative robots**. In particular, its representative model, the 'Indy' series, is a collaborative robot that can work safely with humans based on collision detection algorithm technology. In addition, Neuromeka is developing its business through cooperation with domestic companies in various fields, including a business agreement with Safetics, a startup that develops robot safety solutions, for joint development of safety functions for collaborative robots; a business agreement with ioCrops, a smart farm artificial intelligence solution development startup, to develop smart farm mobile collaborative robots; a business agreement with the pizza brand Gopizza to develop an automated pizza cooking robot system. Neuromeka succeeded in **attracting 14 billion KRW of Series D investment in 2021**.¹⁴⁾



Bear Robotics is a robot startup founded in 2017 by a former Google engineer, and has developed an **artificial intelligence-based serving robot** 'Servi'. Servi was launched in Korea in 2019 and **started overseas services in Japan and the United States**. The headquarters of Bear Robotics are located in Seongdong-gu, Seoul and Silicon Valley, USA. The serving robot of Bear Robotics has autonomous driving technology as its core, and when installed, it learns the structure of the restaurant as a map and drives safely after recognizing obstacles with LiDAR and 3D camera sensors. As of the first half of 2022, 'Servi' performed table service with more than 43 million times and a cumulative travel distance of 820,000 km. Bear Robotics is currently **expanding into the field of quarantine robots** and is actively expanding its business in the robot area for professional services.

Bear Robotics' robot technology was also used in KT artificial intelligence quarantine robot. Bear Robotics succeeded in **attracting 100 billion series B investment in 2022**.¹⁵⁾

Robot startups focus on robotics, the core of future industries

As the robot industry is emerging as a core industry in the future, and the prospects for the robot market are bright with the demand for robots in various industries increasing rapidly, investment in robot startups is also actively being made in Korea. Amid these expectations, robot companies in each field located in Seoul, the center of the Korean robot industry, are concentrating on the development of next-generation robots based on excellent technologies.



14) Robot Newspaper (Dec. 2, 2021), Companies selected as the 2021 Korean robot companies of the year

15) Electronic Times (July 7, 2022), Bear Robotics' serving robot exceeds the accumulated travel distance of 82km.



Angel Robotics is a personal service robot company established in Seongdong-gu, Seoul in 2017, and is **developing and supplying wearable robots for rehabilitation and healthcare.**

The core of the business is to research robot technology that assists human physical abilities based on robotics, develop wearable robots that help the elderly and patients with walking disabilities, and provide rehabilitation solutions. Its representative products include 'Angel Suit', a robotic walking aid that supports insufficient muscle strength through ergonomic design, and 'Angel Legs M', a wearable robot that helps rehabilitation treatment of patients with gait disorders. Since they are applicable to both adult and pediatric patients and can be adjusted according to the wearer's body type, they are used in 12 hospitals and welfare centers nationwide, including Sinchon Severance Hospital, Samsung Medial Center, Seoul Rehabilitation Hospital, and National Health Insurance Ilsan Hospital. Angel Robotics has **attracted 18 billion KRW Series B investment in 2021.** In addition, 'Angel Legs M' is in the process of entering the ASEAN market, starting with Malaysia, by acquiring the Malaysian medical device certification in 2022.¹⁶⁾



ROBOTIS

Robotis is a first-generation robot development company in Korea established in 1999 in Gangseo-gu, Seoul, which provides robot parts such as **DYNAMIXEL, a robot-exclusive actuator, a reducer, a core part of a robot system, TurtleBot3, an autonomous driving robot for research, and a specialized solution for building service robots.** The reducer and DYNAMIXEL DRIVE (DYD), launched in 2021, are leading the localization of the domestic robot parts industry. In particular, DYD continues to expand its lineup targeting the collaborative robot market and the articulated robot market. In addition, Robotis has a competitive edge by focusing on the development of autonomous robots in line with the service trend of the robot industry. The representative product, GAEMI-1, is an outdoor delivery robot that combines the strengths of Robotis' system integration solution and artificial intelligence technology. In addition, GAEMI-2, an indoor delivery robot, is equipped with a robot arm for the first time in Korea and is being provided and operated in hotels. Robotis is accelerating its overseas expansion by establishing **200 distribution networks in 56 countries** including local subsidiaries in the US and China and offices in Japan.¹⁷⁾



16) Angel Robotics official website

17) Robot Newspaper (Dec. 2, 2021), Companies selected as the 2021 Korean robot companies of the year

Gangnam dreams of the world's 3rd largest robot cluster

In order to strengthen the competitiveness of the robot industry, a new growth and convergence industry leading the 4th industrial revolution, Seoul has built a 'Suseo Robot Cluster' in Suseo-dong, Gangnam-gu, to develop it as a robot research hub. As selected for the 'Robot Plus Competitiveness Support Project' by the Ministry of Trade, Industry and Energy in 2020, Seoul has invested a total of 34.7 billion KRW to create a cluster, laying the foundation for intensive nurturing of the Seoul robot industry. The key points of the cluster creation include attracting robot companies, creating robot venture towns, building core anchor facilities for robot clusters, creating test fields, and organizing cooperative governance. Seoul plans to develop the Suseo area into one of the world's three largest robot clusters on a par with Massachusetts, USA and Odense, Denmark.¹⁸⁾

In particular, within the cluster, as part of the 'Collaborative Intelligence-Based Robot Plus Project, a test bed dedicated to robot companies will be built and operated jointly with the Korea Association of Robot Industry, Korea Electronics Technology Institute, and Korea Institute for Robot Industry Advancement. The test bed is planned to be operated by 2025 with the goal of advancing robot technology with collaborative intelligence technology and expanding the robot market. To this end, after August 2022, research and testing equipment such as metal 3D printers, a robot system for manufacturing logistics automation process, and GPU server for acquiring manufacturing site data will be introduced in stages.¹⁹⁾

In addition, Seoul is supporting robot technology commercialization for Seoul-based robot companies to contribute to cluster creation. It strengthens the global competitiveness of enterprises by supporting technology advancement and commercialization of companies with Level 6 or higher of Technology Readiness Level (TRL) in the robotics field such as manufacturing robots, professional service robots, personal service robots, and robot parts and software.²⁰⁾

Seoul creates robot streets as a test bed for verification

The delivery robot as one of the service robots, is expanding its market in the robot industry and distribution industry due to the minimized time and cost and high efficiency. In addition, since the outbreak of the COVID-19, the demand for delivery robots has surged, and domestic startups are rushing to announce the development of robots applying autonomous driving technology and commercialization of services, and are expanding investments for this. By paying attention to the needs of these industries and markets, 'Seoul' is concentrating on improving regulations on the robot industry and expanding public infrastructure to create a robot-friendly city. Seoul creates robot streets in the areas of COEX and Teheran-ro where the demand for service robots is highest in the country. COEX and Teheran-ro are the optimal space for test beds for delivery robots with 33,000 resident employees and 40 million annual visitors.

This project, which was selected as the background for the 'Artificial Intelligence/5G-based Large-scale Robot Convergence Model Demonstration Project' hosted by the Ministry of Trade, Industry and Energy, will be proceeded by Seoul together with Woowa Brothers (Baedal Minjok), LG Electronics, WTC Seoul, Korea Land and Geospatial Informatix Corporation, and Gangnam-gu, by investing a total of 1.97 billion KRW over 18 months from June 2022 to November 2023. In detail, the demonstration of the indoor delivery robot has been carried out in the COEX area from June 2022, and the demonstration of the outdoor delivery robot will be carried out in the Teheran-ro area in 2023.

From Seoul Metropolitan Government website (June 10, 2022), Seoul Economic Policy



[Fig. 9] Autonomous delivery robot put into business

In the demonstration project, Seoul plans to secure empirical data in an actual environment with high on-site demand, prepare personal information protection guidelines, and promote regulatory improvement such as outdoor driving robot safety standards to allow delivery robots to pass on the sidewalk.²¹⁾

18) Gangnam-gu (April 14, 2021), Final Service Report for Establishing Action Plans for Gangnam Robot Hub District
 19) Robot Newspaper (April 22, 2022), Seoul build a test bed dedicated to robot companies in Suseo-dong, Gangnam
 20) Seoul Business Agency, Support for technology commercialization in new growth industries in 2022

21) Seoul Solution (June 9, 2022), Seoul creates an autonomous delivery robot demonstration hub in Coex and Teheran-ro, with a large floating population

● ● ● 3. Seoul creates a sustainable growth environment for robot companies

Seoul Robot Academy for nurturing core robot experts



Seoul is operating the Seoul Robot Academy to focus on nurturing experts in the field of robotics, a new growth and convergence industry leading the 4th industrial revolution. Seoul has recognized the importance of the robotics field and is directly designing and operating it as talent training courses. Above all, in order to nurture talents who can be put into the field, the courses have placed incumbent working-level staff in robotics as instructors, focusing on connecting with companies in the field of robotics in Seoul.



Seoul Robot Academy is designed with three specialized courses: RPA developer, mobile robot-based service SI, and collaborative robot SI coordinator. In addition, the program of each course consists of basic robot theory, application in-depth practice, team project, and internship connected with robot companies..

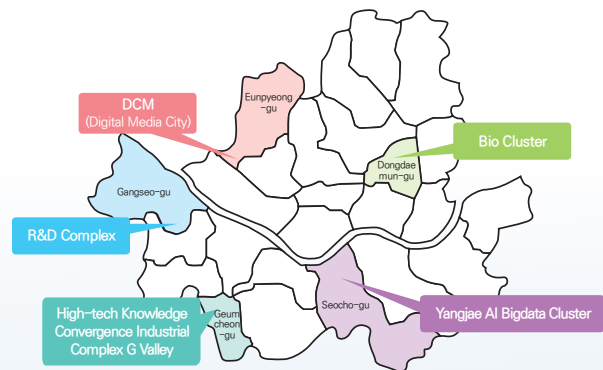
The trainees of Seoul Robot Academy are first selected as talented people who are highly likely to be nurtured as human resources that meet the needs of the industry, and training is provided completely free of charge. This is to foster a new industrial growth engine that can enhance the competitiveness of Seoul's robot sector.²²⁾



The optimal place for the robot industry where the convergence technology infrastructure is concentrated

The robot industry creates greater synergy by converging with major technologies of the 4th industrial revolution such as artificial intelligence, Internet of Things, big data, and 5th generation mobile communication. Accordingly, for the development of the robot industry, high-tech infrastructure and inter-industry collaboration that can converge with robot technology are key.

Seoul has the strength to maximize the robot industry. Technology and industrial clusters are concentrated in Seoul including **artificial intelligence/big data cluster** in **Yangjae**, **Magok R&D industrial complex** where 532 ICT companies are located, **Bio Cluster** located in **Hongneung**, high-tech knowledge convergence industrial complex **G Valley** located in **Guro** and **Gasan**, etc. This proves that Seoul is the most optimal city to expect the effect of collaboration with the robot industry, which requires convergence with new technologies.



[Fig. 10] Seoul robot industry convergence infrastructure

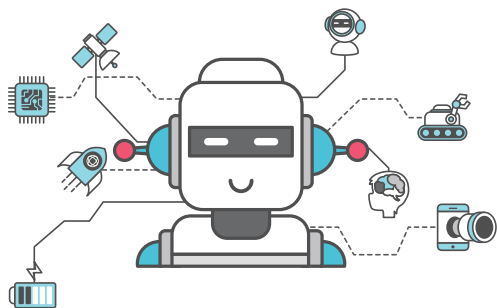
22) Seoul Metropolitan Government press release (July 4, 2022), Seoul fosters talents in robot and drone industry

Seoul is optimized for nurturing experts from robotics high schools to graduate schools

Seoul has one robot specialized high school, five universities with robot-related departments, and three graduate schools. These robot-related higher education institutions are producing excellent talents based on specialized education who can respond to the growing global robot market demand.

From Higher Education in Korea

Cat-egory	School name	Department name	Location
High School	Seoul Robotics High School	Advanced Robot Design Department	Gangnam-gu
		Advanced Robot Control Department	
		Advanced Robot System Department	
		Advanced Robot Information and Communication Department	
Universities	Dongguk University	Department of Mechanical Robot Energy Engineering	Jung-gu
		Intelligent Robot Convergence	
	Kwangwoon University	Department of Robotics	Nowon-gu
		Intelligent Robotics	
	Hongik University	Convergence Intelligent Robotics	Mapo-gu
	Dongyang Mirae University	Department of Robotics	Guro-gu
Seoul Digital University	Department of Mechanical Robotics	Gangseo-gu	
Graduate schools	Hanyang University	Collaborative course between departments of intelligent robotics	Seongdong-gu
		Academic-Industrial Collaboration Course with Korea Robot Convergence Research Institute	
	Kwangwoon University	Department of Robotics	Nowon-gu
	Seoul National University of Science & Technology	Department of Mechanical Design and Robotic Engineering	Nowon-gu



Seoul Robotics High School located in Gangnam, Seoul ranked first in the employment rate in Seoul for four years since 2016, and took up 98% of the employment rate in 2019 as the most preferred robotics master high school by robot companies. Not only the high employment rate, it is showing excellence in winning awards in various international competitions centered on club activities. Seoul Robotics High School has Advanced Robot Control Department, Advanced Robot System Department, Advanced Robot Information and Communication Department, and all departments focus on creative education based on convergence thinking above all else. So, after graduation, most of the students enter public corporations, conglomerates, and robot companies, becoming the foundation of the Seoul robot industry.²³⁾



The Department of Robotics at Kwangwoon University is the first robotics department in Korea and has been operating Robotics & Artificial Intelligence Laboratory (RAIL) since 2019, which consists of 4 master's students and 8 undergraduate research students, and is led by Professor Oh Jeong-hyeon, a graduate of Seoul National University. Their main research area includes the development of autonomous driving robot navigation such as artificial intelligence-based simultaneous localization and mapping (SLAM), route planning, and collision avoidance using mobile robots. In addition, through research, they developed an autonomous robot 'MIA' to find lost children and a mask detection and guidance robot 'MARO'.²⁴⁾



Seoul National University of Science & Technology operates the Department of Mechanical Design and Robotic Engineering in its graduate programs, which focuses on research in the field of advanced mechanical design and mechatronics. In particular, the Robot Nano Control Lab, run by Professor Dong-hwan Kim, who are in charge of mechatronics, robotics, and artificial intelligence in the departments, has conducted a number of robot-related research and has published 44 articles with registered 10 patents.²⁵⁾

23) Edupress (Sept. 21, 2020), Seoul Robot High School ranked first in the employment rate in Seoul

24) Robot Newspaper (July 19, 2022), "A Young Robotic Engineer" Professor Oh Jeong-hyeon of Kwangwoon University

25) Seoul National University of Science & Technology's Robot Nano Control Lab official website

Robot research institutes in Seoul lead global robot convergence technology

In addition to the newly established department of robotics, other existing departments such as the department of mechanical engineering, computer engineering, and intelligent convergence systems are actively conducting research on robot technologies to produce outstanding talents in the robot industry.

In addition, research institutes and university hospitals are operating robot labs to conduct various innovative R&D.

Intelligent Robotics Laboratory Department of Mechanical Engineering Korea University

Korea University's Intelligent Robotics Lab (IRL) was established in 1993 by Professor Song Jae-bok of the Department of Mechanical Engineering as the first laboratory conducting collaborative robot research in Korea. Its core research areas, in particular, are design and control technology for industrial and service robotic arms, and autonomous driving technology for mobile robots. About 25 graduate students in the lab have so far published more than 300 articles in Korean and international journals and conferences, and have obtained 12 patents.²⁶⁾

HANYANG UNIVERSITY Mechatronics Lab

Hanyang University's MECHA (Mechatronics Lab) is a laboratory operated by Professor Jong-Hyun Park of the Department of Mechanical Engineering, and its main research areas include biped walking robots, humanoids, bio-robots, and bio-system control. Through various research, MECHA published 36 papers in international journals and 26 papers in Korean journals.



Seoul National University's Dynamic Robotic Systems Lab (DYROS) was established in 2009 and has been operated by Professor Jae-Heung Park of the Graduate School of Convergence Science and Technology. Consisting of about 30 doctoral and master's researchers, DYROS is researching humanoid robots, autonomous driving cars, and wearable robots as core fields. With the main research areas as intelligent convergence systems, DYROS design humanoid

robots, quadruped robots, and robotic hands using dynamics-based flexible and environment-adaptive control methods, and develop human-like robot movements by analyzing human motions acquired through motion capture. In addition, wearable robots for human behavior assistance, medical surgical robots, and emergency rescue robots are also studied here. DYROS began to attract attention by finishing 12 out of 23 teams in the DARPA Robotics Challenge (DRC Finals 2015) held in the United States in 2015.²⁷⁾ In addition, at the 'ANA Avatar Xprize' sponsored by Japan Airlines ANA in 2021, Professor Jae-Heung Park's DYROS demonstrated an avatar system based on motion mapping between the pilot and robot, rare technology, robot hand, and tactile sensor technology, and even made it to the finals.²⁸⁾



Korea Institute of Science and Technology's AI/Robot Research Institute (AIR) is the largest AI/Robot Research Institute in Korea. Based on the development of high-level artificial intelligence and robot technology, it is conducting R&D of AI/next-generation media and robot core technology to solve national and social problems. AIR consists of about 250 researchers in the field of artificial intelligence and robotics and 3 research groups of Artificial Intelligence Research Center, Intelligent Robot Research Center, Healthcare Robot Research Center. In particular, the Intelligent Robot Research Center was selected as the hub research center for the 'Pandemic Response Robot and ICT Convergence Prevention System Development project' in 2020. In addition, the Development of Solution for 'Diagnosis, Treatment and Care system of Dementia' project and 'the Social Human-Robot Interaction Technology Development for Human Care project' were selected as a future-leading convergence research group projects so that AIR continues to conduct research in the field of intelligent service robots. In addition, the Healthcare Robot Research Center secured core technologies related to medical robots by developing VR/AR surgical navigation systems, catheter intervention robots, and microsurgery robots, and through this, developed a medical intelligence-based digital support surgical robot system.²⁹⁾



Asan Medical Center's Healthcare Electronics, Automation, and Robot Technology (HEART) lab focuses on research and development of biomedical engineering convergence technology that can be applied to diagnosis, treatment,

26) Korea University's Intelligent Robotics Lab official website

27) Robot Newspaper (Aug. 18, 2016), Seoul National University's DYROS

28) Veritas-a (Oct. 29, 2021), Team SNU led by Professor Jaeheung Park from the Graduate School of Convergence Science and Technology advances to the final of ANA Avatar Xprize

29) Korea Institute of Science and Technology's AI/Robot Research Institute (AIR) website

rehabilitation, and assistance in the clinical field using robot, device, simulation and artificial intelligence technology. Asan Medical Center's clinical teams are conducting joint research in such fields as cardiology, plastic surgery, orthopedic surgery, rehabilitation medicine, radiology, neurology, anesthesia, urology, and otolaryngology.³⁰⁾ HEART lab is composed of about 25 researchers, and characterized by a director who is an engineer, not a doctor, for the development of convergence technology between medicine and engineering. As a result, the lab is developing an arrhythmia treatment robot, an auxiliary robot for urological endoscopy, and an auxiliary robot for oral cavity surgery in collaboration with small and medium-sized companies, and these are currently in exploratory clinical trials.³¹⁾



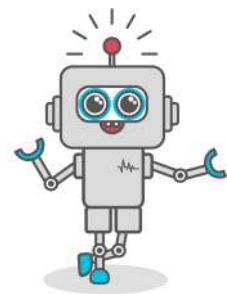
Gangnam ICT Robot Living Lab was opened in 2020 to nurture robot-related start-up-inducing experts and to promote commercialization and collaborative research of start-ups, as managed by Korea Robot Convergence Research Institute. The Living Lab consists of a corporate office, specialized equipment for robot and AI research, and a 'Human Interaction Lab' for living lab experiments based on real-world demonstrations.³²⁾ The Living Lab provides the Living Lab test space for companies that want to conduct business in the robot field, rents equipment for technology and service development in the robot field, provides common spaces such as laboratories, conference rooms, and seminar rooms, collaborates with R&D with research institutes, and links to corporate support programs.³³⁾ Currently, 16 companies researching wearable robot suits and barista robots, etc. are located in the corporate occupancy office.³⁴⁾

30) Asan Medical Center Biomedical Engineering Research Center official website
 31) Money Today (June 2, 2021), Aiming at the 43 trillion KRW medical robot market with convergence led by pragmatism
 32) Yeogie News (Nov. 17, 2020), Korea Robot Convergence Research Institute opened Gangnam ICT Robot Living Lab.
 33) Announcement of recruitment of resident companies in 2022, as of April 14, 2022
 34) TODAY NEWS (May 26, 2020), Opening of Gangnam ICT and Robot Living Lab

Specialized institutions that build the ecosystem of the robot industry in Seoul, Korea



The Korea Association of Robot Industry, located in Yongsan-gu, Seoul, was formed in May 2008 by integrating Korea Association of Robotics (established in 1999) and Korea Advanced Intelligent Robot Association (established in 2003). It recruits robot-related companies as members and carries out various projects for the development of the Korean robot industry such as R&D, human resource training, design development, international cooperation projects by hosting of Robo World, domestic robot industry statistics, etc.³⁵⁾ In particular, in 2018, the Korea Association of Robot Industry signed a business agreement with Seoul for Revitalization of Robot Industry in Seoul to foster Seoul as an outpost for the 4th industrial revolution based on robots and artificial intelligence. In addition, it is planning to establish a robot science museum in Chang-dong, Dobong-gu, Seoul, to form a high-tech robot demonstration and experience space.³⁶⁾



35) Korea Association of Robot Industry official website
 36) Seoul Metropolitan Government website (Oct. 24, 2018) Seoul signed an MOU with the Korea Association of Robot Industry to revitalize the robot industry



● ● ● 5. Seoul has achieved ESG with robots

ESG management, such as environmental, social responsibility, and governance improvement, is a global trend and becoming an essential element for sustainable growth. Accordingly, the business areas of robot-related companies in Seoul are also changing to keep pace with environmental, safety, and medical robots.

Hyundai Motor realizes corporate social responsibilities by developing safety robots.

HYUNDAI
MOTOR GROUP

Hyundai Motor Group developed a 'Factory Safety Service Robot' that detects risks and guarantees safety at industrial sites in the wake of the accidents by employees of subcontractors at Hyundai Motor's factory in the past and the enforcement of the Serious Accidents Punishment Act.

Factory Safety Service Robot has been developed by linking the 'AI processing service unit' of Hyundai Motor Group's Robotics Lab to 'Spot', a quadrupedal robot of Boston Dynamics. Through 'the application of the AI Unit', real-time data processing based on various sensors and deep learning has strengthened the function of detecting door opening, high-temperature risk, and unauthorized intrusion. In addition, the robot can be remotely controlled through the communication module and control system inside the AI Unit, enabling external monitoring of industrial sites.

As such, Factory Safety Service Robot is expected to contribute to preventing human casualties at the source as the robot autonomously inspects industrial sites after workers leave work and helps early morning patrols to monitor in a safe environment.

Hyundai Motor Group plans to put Factory Safety Service Robot into full-scale use in industrial sites through robot system optimization and functional reinforcement after test-operating it at Kia Autoland Gwangmyeong from September 2021.³⁷⁾

LG Uplus contributes to carbon neutrality by developing an environmental monitoring robot.



LG Uplus is accelerating the discovery of innovative ESG business models, such as providing environmental management robot services for carbon neutrality, by catching the trend of businesses and local governments expanding the adoption of ESG management.

In particular, by collecting atmospheric environment information such as fine dust, carbon monoxide, nitrogen dioxide, sulfur dioxide, ammonia, and volatile organic compounds, LG Uplus put six autonomous robots based on 5th generation mobile communication that can identify the source of pollution into Jeonju in 2021. Jeonju has been creating a pleasant air environment through monitoring based on LG Uplus' environmental monitoring robot.³⁸⁾

LG Uplus has actively responded to environmental pollution and climate change through robots and obtained Leadership A grade in the climate change evaluation of the Carbon Disclosure Project (CDP) in 2021. As a result, it has been selected as Climate Change Response Excellent Company for eight consecutive years, taking the lead in creating a low-carbon society.³⁹⁾



37) The Korea Economic Daily (April 21, 2022), Euisun Chung's 'Robot Dog' also patrols SK hynix's semiconductor factory.

38) Maeil Business Newspaper (Aug. 25, 2021), 5G Robot detects hazardous substances, LG Uplus seizes business opportunity at ESG

39) LG Uplus official blog, Newsroom/Press release, (Feb. 4, 2022)



The global company Hyundai Motor drives the world with innovative robot technology in Seoul

Q What is the status of Hyundai Motor's robot business?

In 1978, Hyundai Motor introduced robots to the automotive welding process for the first time in Korea, marking the beginning of the domestic robot industry, and since then, we have contributed to the development of industry and technology as the largest consumer of industrial robots to date. In addition, we established Robotics Lab, an organization dedicated to robots, to strengthen expertise in related technologies, and acquired Boston Dynamics, a world-class robotics technology company, in 2020, in order to steadily accumulate our robot business and technology capabilities. Through this, we are not simply using robots in our business areas (industry and service), but are expanding into the global market.

Q What differentiates Hyundai Motor's robot business?

Unlike existing robot manufacturers, Hyundai Motor possesses world-class technologies in autonomous driving (walking), perception, and control based on its strength in the field of mobility. As an example, at CES 2022, we unveiled robot technologies called Plug and Drive Module (PnD module) and Drive and Lift Module (DnL module).

QnA

Su-min Shim Senior Researcher

HYUNDAI
MOTOR GROUP
Robotics LAB

Senior Researcher, Robotics Planning Team (Robotics Lab),
Hyundai Motor Group

Q What is the prospect of the robot industry, and what is Hyundai Motor's response strategy?

Artificial intelligence's computational processing power is now growing a rate dozens of times faster than Moore's Law, which states that semiconductor density doubles every two years. Therefore, we will discover the needs of the robotics market so that these new technology-intensive robots can naturally become common in our daily lives, and will also enhance our competitiveness in product planning and service development to induce purchase intentions from the customer's point of view.

Q Are there any cases of cooperation in the field of robots with companies in Seoul?

Robotics Lab is not currently carrying out specific cooperation with companies located in Seoul; however, ZEROINE (located in Gangnam-gu, Seoul), an organization in charge of open innovation for start-ups of Hyundai Motor Group, provides advice on investment and accelerating activities for robot start-ups.

Q Are there any cases of cooperation between industry, academia, and research in the field of robots?

From the perspective of R&BD, organic cooperation between industry, academia, and research is essential; however, Robotics Lab is currently taking time to strengthen its internal capabilities to lay the foundation for creating synergy with them. Going forward, we plan to gradually expand cooperation with universities and research institutes.

Hyundai Motor signed an agreement with Korea University to establish and operate the Department of Smart Mobility for about 5 years from 2023, including the robotics field. In addition, Hyundai Motor signed a joint research agreement with six aerospace-related research institutes (ETRI, KASI, KICT, KARI, KAERI, and KATECH) to support robotics technology for the development of lunar exploration mobility technology.

Q What do you think about the expansion of robots in the future?

As mentioned above, thanks to the rapid development of artificial intelligence and core technologies, the range of application of robots will be expanded to all areas of life beyond the limited cases of existing serving robots, including clothing (wearable robot), food (F&B serving/cooking robot), dwelling (robot friendly building, etc.). Therefore, in order to build a sustainable growth model that is not just a temporary phenomenon, deregulation and profit models should be supported.

Q What is important to foster the robot industry in Seoul?

Regulations need to be improved to activate new technology-based businesses. In this respect, I think the pilot project of RoboRide, an autonomous vehicle operated in downtown Gangnam, actively supported by Seoul, is a good example of cooperation that can be referenced worldwide. Similarly, robots also need to increase the precision of their services through a lot of trial and error, and it is necessary to provide a wide range of users with a positive experience of robot services to form initial demand and increase the incentive to participate in building the ecosystem.

Stable operation of various types of robots requires organic linkage with the surrounding environment. For example, if robot-friendly technologies were reflected in advance in the design of new construction of large-scale infrastructure such as the Global Business Center (GBC), it would serve as a practical reference. To this end, in addition to technology, policy support, such as deregulation of autonomous driving and setting insurance premiums for robots, is needed. In addition, lowering entry barriers for participation of various companies through regulatory sandbox and tax support in demonstration areas would also be a catalyst for the development of the robot industry.



Angel Robotics creates social value by leading the rehabilitation robot market

Q Please introduce Angel Robotics.

Angel Robotics specializes in wearable robots, which develops and commercializes various wearable robots such as medical devices used in hospitals, auxiliary equipment used at work sites, and robot aids for daily life. It is a five-year-old startup jointly founded in 2017 by myself, who majored in robotics engineering and is currently a professor at the Department of Mechanical Engineering at KAIST, and Professor Dong-wook Rha, who majored in rehabilitation medicine and is currently working as a specialist at Severance Rehabilitation Hospital. Angel Robotics has been recognized for its excellent technology related to rehabilitation and healthcare wearable robots, and has succeeded in attracting a total investment of KRW 40 billion, including KRW 18 billion in Series B round in 2021. In particular, Angelex Medical products, which have recently been successfully commercialized, are expected to generate sales of KRW 3 billion by the end of this year.

Q What differentiates Angel Robotics?

Angel Robotics is developing a wide range of wearable robots based on driving control technology that precisely transmits assistive power and intention detection technology that detects walking intention, including gait training wearable robot for patients with gait disorders, a wearable robot that helps paraplegic patients walk, and a wearable robot for muscle strength support for heavy workers. With these robots, we won gold and bronze medals at the Cybathlon International Competition 2020 at the same time, were selected as products for pilot use of excellent commercial products by the Ministry of National Defense, and were also selected as one of 37 innovative products by the Public Procurement Demand Exploration Committee. Above all, the excellence of the our wearable robot products has been proven, and they are actively supplied to more than 30 hospitals and welfare centers nationwide, contributing to everyone's daily life with robot technology.

Q What are the advantages of being located in Seoul as a robot startup?

Angel Robotics was initially established in Seodaemun-gu; however, as the scale of the company expanded, we moved to Seongsu-dong, where factories requiring large-scale land can be located. The reason why Seoul is so attractive to a robot startup is that, above all, excellent human resources are concentrated here. It was natural for me to locate Angel Robotics in Seoul, as there are many excellent talents in the entire process of operating a company, from robot-related technical talents to marketing/sales talents. In addition,

QnA

Kyoung-chul Kong, CEO



- PhD in Mechanical Engineering, UC Berkeley, 2009
- Postdoctoral researcher, UC Berkeley, 2009-2010
- Professor, Department of Mechanical Engineering, Sogang University, 2011-2018
- Founder and CEO of Angel Robotics Co., Ltd., 2017-Present
- Professor, Department of Mechanical Engineering, KAIST, 2019-Present

since Angel Robotics develops wearable robots to assist with rehabilitation, linkage with hospitals is very important. In Seoul, large hospitals such as Severance Hospital and Samsung Medial Center are concentrated and this make it the best location for business.

Currently, even in major developed countries such as the United States and Japan, rehabilitation treatment using robots is not as active as in Korea, so from this point of view, Seoul can be said to be the most advanced city in this field.

Q Please tell us about your experiences working with companies, universities, research institutes, and organizations in Seoul.

Angel Robotics jointly developed a customized wearable suit with CJ Logistics located in Seoul to reduce worker fatigue, prevent injury, and improve work efficiency at the logistics site, and is expanding the business.

Also, through cooperation with universities such as Seoul National University and Shinchon Severance Hospital, we tested and evaluated the usability of the our products, and further discussed the direction of development and planning to improve the product's technological power.

In addition, Angel Robotics has proposed to support sanitation workers and caregivers with the product, Angel X, for the Accompanying with the Vulnerable project currently being promoted by Seoul.

Q What is the prospect of the robot industry and Angel Robotics' response strategy?

The existing robot industry was limited to manufacturing robots, but it is expected that expectations for personal service robots will eventually grow in the future. Under these circumstances, from a technical point of view, Angel Robotics is focusing on the fact that the body sizes of those are wearing the wearable robot are different, and is working to develop robot technology that can be easily transformed to suit various needs. In terms of sales, we are focusing on branding by opening an experience center within the company to target the B2C market.

Looking at the future of Seoul's robot industry from the cradle of talent development

Q How is Chung-Ang University's robotics education conducted?

In the undergraduate course of the Department of Mechanical Engineering at Chung-Ang University, basic engineering-oriented courses related to mechanics such as statics, dynamics, thermodynamics, and fluid dynamics are organized until the first and second year, and from the 3rd and 4th year, the curriculum consists of specialized courses such as automatic control, mechatronics, and robotics related to robots. In particular, in the graduate school curriculum, the robot convergence majors are operated centered on the 4th stage BK21 Intelligent Wearable Robot Education Research Center.

Q What differentiates Chung-Ang University's robot education?

The Department of Mechanical Engineering at Chung-Ang University is operating the Intelligent Wearable Robot Education Research Center through the government's 4th stage BK21 project. It can be said that we are specialized in the field of wearable robots. Courses related to human body mechanics, artificial intelligence, soft actuators and sensors suitable for the field of wearable robots have been opened and lectures are being conducted accordingly, and through this, Chung-Ang University is differentiated in nurturing human resources in the field of wearable robots.

Q Please tell us about the research experiences in collaboration with industry, academia, research institutes, and governments in Seoul.

Chung-Ang University was selected for the Samsung Future Technology Promotion Project conducted by Samsung Electronics and conducted research to develop actuators necessary for wearable robots. In addition, we are carrying out various collaborations in the form of industrial projects with robot-related companies such as Hyundai Motor.

Q What are the main career paths for Chung-Ang University robotics majors after graduation?

After graduating from our laboratory, students advance to various large corporations that are engaged in robot-related fields such as Samsung Electronics, and are demonstrating their capabilities that they have studied at university. In addition, in our laboratory, we are running our own startup with students to develop medical wearable robot suits and solutions, so that graduates are actively engaging in social activities in the field of robots after graduation.

QnA

Professor Gi-uk Lee



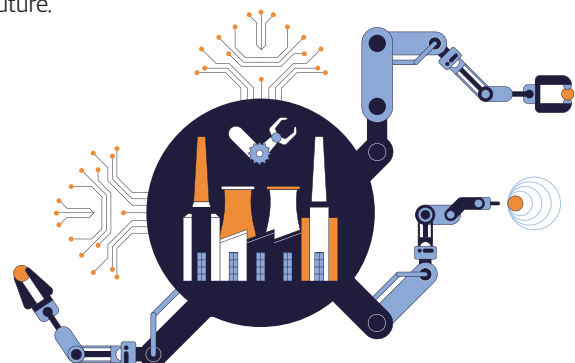
- Ph.D., Department of Mechanical and Aerospace Engineering, Seoul National University, 2010-2014
- Commissioned researcher of the Center for Robotics, KIST, 2015-2016
- Postdoctoral researcher at the Department of Applied Science and Engineering, Harvard University, 2016-2017
- Assistant Professor, Department of Mechanical Engineering, Chung-Ang University, 2018-2022
- Director, Chung-Ang University Human-Robot Convergence Research Center, 2022-Present
- Co-CEO of Hurotics Inc., 2022-Present
- Associate Professor, Department of Mechanical Engineering, Chung-Ang University, 2022-Present

Q What are the advantages of Seoul as a robot investment destination?

First of all, Seoul has the advantage of having a large number of outstanding universities, and robot-related talents. In addition, robot-related laboratories are actively operated at universities, and various researches are conducted to solidify the foundation of robot technology. Second, as Seoul is a large city with a population of 10 million, it is very easy for robot companies to have opportunities to test the marketability of their products and observe consumer reactions. In these respects, Seoul is a very attractive city for companies in the field of robotics.

Q What areas most need cooperation and collaboration with robotics?

Since robotics is not a single discipline, but rather a system engineering, convergence is especially important. In particular, in order to utilize robots in any field in the future, it is expected that talents who specialize in services in that field will plan a strategy, and at the same time, robot engineers will develop technology suitable for this strategy. From this point of view, I think that convergence with human resources in real fields such as sociology or business administration will be important in robotics in the future.



Preparing for the future in Seoul, the capital of robots

Q How did you come to major in robotics?

I had a dream about robots even before entering college, so I have been learning in various fields so far to do robotics. In the undergraduate course, I majored in medical engineering in the Department of Electronic Engineering to understand biomechanics. In the master's course, I came across and became interested in the field of rehabilitation robots while conducting bio-signal research such as brain signal research. Currently, I am studying a doctoral course related to rehabilitation robots at the Department of Mechanical Engineering at Chung-Ang University. Among many robot development courses, I am especially focusing on electronic circuits and control fields. In fact, in order to develop robots, I desperately feel that knowledge from various majors, such as electronic engineering and computer programming, should be converged rather than a single major.

Q What is your future career path?

I thought that if I got a job at a large company or a government-funded research institute after the doctoral course, it would be impossible to realize my dream in the field of robots because there would be restrictions on independent research. So, rather than getting a job, I decided to start a startup with my professor, and now I've developed a medical software wearable robot suit based on artificial intelligence technology.

Q Please tell us about your experience receiving support.

It was very difficult for students to set up a company because startups cost a lot of money. When I started a wearable robot startup with my professor, I received support for production and labor costs, public relations and marketing through the government's (KISED) Pre-Startup Package. In addition, we were provided with an office through the Dongguk University Business Incubation Center located in Seoul.

QnA

Seung-tae Yang Ph.D.,



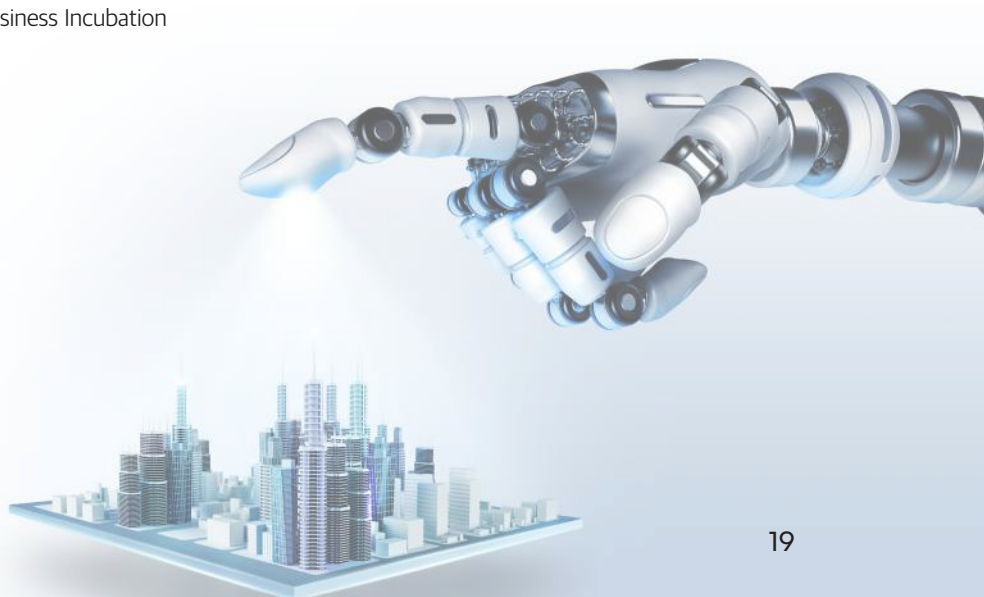
• Department of Mechanical Engineering, Chung-Ang University

Q What do you think is the most important thing about majoring in robotics?

In order to become a practical robot engineer, I believe that there should be many opportunities for practice based on solid basic theory. Since new variables often appear in actual research, I think it is very important to learn problem-solving skills through various practices. In that sense, I would like the government or local governments to support with various robotics competitions or team project competitions for students.

Q What do you think are the strengths of Seoul from the perspective of a robot major?

From the standpoint of a student majoring in robotics, Seoul has various advantages; however, the biggest advantage is that it is the best city as a maker space. Above all, there are field experts with accumulated experience in Jongno Sewoon Shopping Center and Guro Electronics Shopping Center, which sell electronic products. I received a lot of help from them in implementing my research results. I believe that Seoul's industrial assets accumulated over a long period of time will serve as the basis for the development of the robot industry.



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.⁴⁰⁾

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

Seoul, the Growth Hub
of Korea's **Robot** Industry



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