

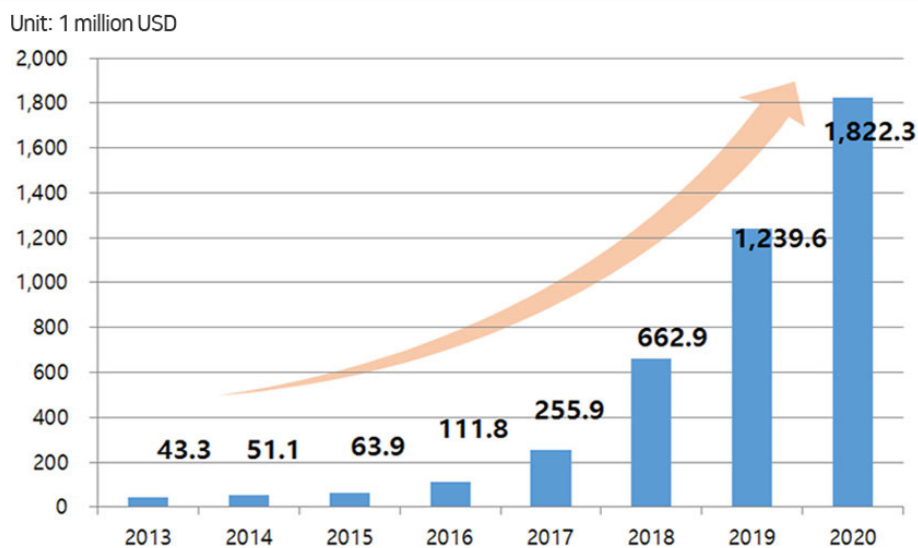
A Barrier-Free World Created by Human-Robot Interface Technology

Written by Park Se-Hoon, Head of the Advanced Prosthetics Research Team,
Rehabilitation Engineering Research Institute, Korea Workers' Compensation and Welfare Service

Growth The Growth of Medical and Rehabilitation Robots

Due to the rapid development and changes in the domestic industry in recent years, the quality of life of individuals has improved significantly compared to that of the past. In particular, with the rapid development of the robotics industry and artificial intelligence, the production line has been optimized through robot-based factory automation and improved work efficiency through collaboration with humans, resulting in increased work safety and productivity. Augmenting human-robot interface technology is emerging as a major concern. In particular, the global market for medical and rehabilitation robots was expected to grow exponentially from 2013 to 2020, and these include rehabilitation robots, prosthetic arms and legs, and wearable (exoskeleton) robots.

Global Market Size for Medical and Rehabilitation Robots



* Rehabilitation Robots, Active *Prostheses, and Exoskeletons

- Market Shares, Strategies, and Forecasts, Worldwide, 2014 to 2020

The Robot-Human Interface in Real Life

A major area in which human-robot interface technology can be applied to real life is the field of rehabilitation robots. Wearable robots are for paralyzed patients, EMG (electromyography) prostheses for upper-limb amputees and MPKs (microprocessor-based prosthetic knees) for lower-limb amputees. The prosthetic leg is a representative rehabilitation robot (rehabilitation assistance device). By identifying the user's intended motion and using a human interface robotic device to replace the paralyzed or amputated body part, as if it were one's own hand or foot, the wearable robot overcomes many limitations in daily life due to disability and participates in various social activities. By simultaneously improving the quality of life of those around us as well as their family members, it is possible to obtain human resources at the national level that could otherwise be lost.

The Development of a Variety of Rehabilitation Robots

As for wearable robots, they have been studied to the extent that by performing the role of a paralyzed leg of a patient with lower extremity paralysis, they improve health through restoring the ability to walk and overcome limited area movement in daily life in conjunction with wheelchairs, enabling a more independent daily life through free movement. Without additional complicated devices such as switches and body movements, electromyography prosthesis (EMG) signals, which are bio-signals generated from the remaining muscles, can grasp objects conveniently, such as a human hand does. Recently, a five-fingered EMG has been developed, and various auxiliary devices have been developed to ensure independent activities. Next, in the case of amputated femor prosthesis, the current simple mechanical control-based prosthetic leg has been used by the patient with training to match the desired function of the prosthesis limb, but with restricted movement due to the possibility of falls. But now, an electronically controlled prosthetic (MPK) has been developed that automatically optimizes and operates according to the patient's walking patterns through a small microprocessor-based control, providing a basis for many lower-extremity amputees to perform various activities through stable walking without the worry of falling.



Rehabilitation robots being developed in Korea
(by the Rehabilitation Engineering Research Institute, Korea Workers' Compensation and Welfare Service).

- (a) Wearable robots for the disabled
- (b) A number of electromyography prostheses for upper-limb amputees
- (c) Advanced hydraulic prostheses (MPKs) for lower-limb amputees

Present

The Reality of Rehabilitative Aids Technology in Korea

However, most of the rehabilitation assistance devices that are rehabilitation robots currently sold in Korea are foreign-made, except for some products developed at the Rehabilitation Engineering Research Institute of the Korea Workers' Compensation and Welfare Service, and there are almost no related domestic companies. Some domestic products have even been shunned in the market because durability-related verification was not directly related to patient safety before the establishment of testing and certification systems. Although Korea is said to be on par with advanced countries in ICT and robotics, research for the disabled is very insignificant compared to overall research expenditures, and national R&D technology transfer is less than one percent (STEPI, 2017).

The Future of Domestic Barrier-Free Technology

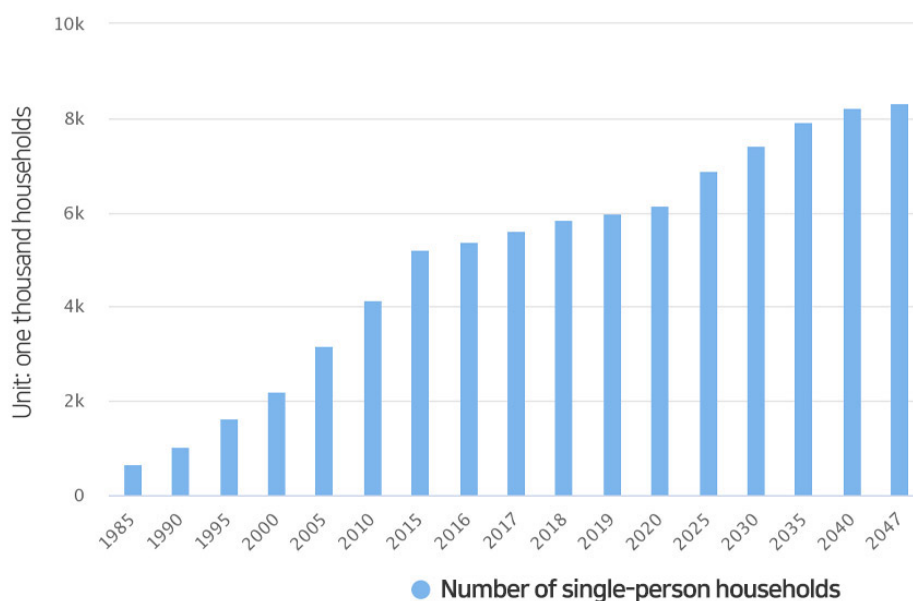
Recently, however, not only the National Rehabilitation Center, but also the Rehabilitation Engineering Research Institute of the Korea Workers' Compensation and Welfare Service and the Pan-ministerial Project have been continuously investing in R&D related to the disabled at the national level. In 2022, tasks related to research and development projects for the elderly and disabled will lead to the development and commercialization of femoral prosthesis technology (4.9 billion won for two years) and will be commercialized through a demonstration system and distributed as a public benefit item. If the state continues to invest in research focused on commercialization at the same time as R&D, various domestic rehabilitation devices will soon occupy the market, thereby reducing the financial burden of the disabled and supplying high-quality products to revitalize related industries, which is expected to enhance national competitiveness.

A Companion Robot That Interacts with Humans

Robots are not new in our lives. They are already replacing simple repetitive tasks in industrial sites, and robots that deliver food are active in restaurants. In recent years, as artificial intelligence is combined with these robots, the wave of innovation in our daily lives is increasing. This is because the so-called “companion robot” is interacting with humans and becoming their companion.

A Robot That Becomes a Companion to Humans

The increase in single-person households shows a global trend. As the number of single-person households is accelerating and the population declines, various solutions are being sought, including government ministries in each country and companies connecting the lonely elderly and young people.



Source: Social Security Committee, annual number of single-person households and estimates (1985-2045).

To solve these social problems, the concept of the "companion robot" has emerged. A companion robot is a robot designed to help humans, and with the addition of artificial intelligence, it can make human life richer. Accordingly, research on companion robots is being conducted to improve the level of human welfare, and it is expected to develop into a high value-added industry.

A Companion Robot for the Lonely Elderly



Source: Intuition Robotics, Intuition Robotics' Elli.Q.

Intuition Robotics, an Israeli companion AI robot company, launched the Elli.Q companion robot for the elderly in the U.S. market earlier this year. According to a survey, one in four American adults over the age of 65 experiences social isolation, which is also considered to be a factor lowering life expectancy. Intuition Robotics expects that Elli.Q can be an alternative to solve this problem. Elli.Q is a product based on human-robot interaction, but it is designed to look like a machine rather than a humanoid robot. The reason it is designed in this way is to focus more on conversational skills. Elli.Q is divided into two main parts. The first is a lamp-shaped "face" with a microphone and a speaker that moves with light, designed to convey subtle emotions to humans and provide friendliness through sound. The second part is a touchscreen tablet that is used to display photos or additional information, or perform video-call functions.

Elli.Q learns the user's daily life, habits, schedule, and appointments; asks the user questions at the necessary moment; and asks follow-up questions or provides necessary information according to the user's response. In addition, it provides a service that allows users to interact with it, which can be executed through Elli.Q's AI engine and vast amounts of data and information-processing technology. In addition, it performs basic communication functions such as playing videos or music, making video calls, and sending text messages. The most important function of Elli.Q's, which is designed for older users, is to track health records and vital signs. Elli.Q uses health-related data accumulation and services to remind elderly users to eat and exercise.

New York State has announced plans to distribute Elli.Q to more than 800 seniors living in the state. It is expected that this will provide independence and social interaction for the elderly living alone and contribute to solving the health problems of the elderly population.

Increased Launch of Companion Robots for Various Applications

Many companies have recently been releasing various types of companion robots, the most notable type of which is the "pet" robot. Earlier this year, Sony launched the AI-based pet robot "Aibo." Aibo's face is equipped with a camera, and its feet are equipped with sensors. By learning the user's habits, it is able to form an emotional attachment with the user. Because anime characters are popular in Japan, Aibo has been more instrumental in reaching Japanese users.

More than 30,000 units of the head-, arms-, and legs-free pet robot "Qoobo," launched by Japanese startup Yukai Engineering, have been sold. Qoobo has only a furry body and a tail, and its tail is programmed to mimic the movements of animals.

Transporting goods is also one of the main areas in which a companion robot can be used. In Newcastle, England, a test was conducted last year using the world's first cargo robot "Gita" for the elderly. The robot can carry objects weighing up to 23 kg, and can provide a 360-degree view and sense the surrounding environment by utilizing six on-board cameras. Through this test, the plan is to find a way to improve the guitar as a companion robot for the elderly.

Government-Level Introduction of Companion Robots



Source: inceptivemind.com, Franzi at German hospital.

Neuperlach, an autonomous district in Munich, Germany, has introduced a robot called "Franzi" that can clean hospitals, talk to patients and medical staff, and sing as COVID-19 spread. Franzi has a pre-programmed cleaning path, and if someone is blocking the path, it will say something like "Would you mind getting out of the way?" In particular, as it became impossible to visit the hospital due to COVID-19, it was helpful for patients to feel emotional closeness with Franzi.

Canada's Canadore College is using two robots, Mork and Mindy, to study whether robots can solve the problem of social isolation of the elderly. The project is for the elderly living in retirement homes, and it plans to verify the effectiveness of the elderly's health management, human relationship management, and well-being program using robots.

Korea's Companion Robot

A consortium of the Sangmyung University and Seoul National University R&DB Foundation has developed human-friendly human-robot interaction technology. The robot uses no-contact sensors such as cameras and kiosks to measure heart rate, breathing, and skin temperature as well as voice, facial expressions, and behavior to recognize the subject's condition and express the result.

Through this, it is possible to reduce direct and indirect economic costs associated with psychiatric conditions as well as to solve social problems. It is expected to be able to provide remote treatment for patients suffering from trauma and dementia, as well as for self-healing in daily life.

Currently, this technology is being used in training to maintain the composure of the national archery team. The heart rate of athletes was measured contact-free at the Tokyo Olympic archery event and displayed on the broadcast screen. Robocare Co., Ltd. is manufacturing various robots equipped with individual and group cognitive training systems for the silver generation. Based on the group-type robot cognitive training system, Silbot and home cognitive training robots Bomi-1 and Bomi-2 have been created for the elderly and those at risk of dementia to help to prevent dementia and activate brain functions. They also provide care services.

On display at this exhibition is the Macroact-developed robot cat MyCat, which looks like a companion animal very similar to Sony's robot dog, Aibo. MyCat combines artificial intelligence technology and robotics to interact with people, differentiating them by examining their facial expressions through micro-cameras, speakers, and sensors.

Major Technology Development Projects in 2022

Category	Main Contents	Budget for 2022
Care Service	Development of human-following semi-autonomous bed robots for quarantine and transport of infected patients.	1 billion won
	Development of a robotic system for nursing assistance and patient monitoring in an infectious isolation ward.	1.2 billion won
	Development of care robots for isolation treatment facilities (Ministry of the Interior and Safety)	1.3 billion won
	Care robot research and service model development (Ministry of Health and Welfare)	3 billion won
Wearables	(New) Development of companion robots capable of emotional sympathy through physical and cognitive interaction between humans and robots.	1.4 billion won
	Development of soft-sensor-embedded cloth actuator and garment robot technology.	700 million won
	(New) A wearable robot that assists daily life with an in-home health care function,	1.2 billion won

Source: Ministry of Trade, Industry, and Energy. (2022). Intelligent robot action plan.

The Korean government is supporting the development of care robots according to the National Basic Plan for Caring and Rehabilitation for the Disabled and the Elderly. Four types of care robots have already been supported (posture change for bedsores prevention, lifting aid, excretion assistance, and meals assistance). It will continue to support the development of a no-contact upper-extremity rehabilitation robot system, a lightweight wearable upper-extremity rehabilitation robot system, and a patient-centered no-contact self-rehabilitation platform.

In addition, efforts are being made to improve the quality of life for people by using companion robots, such as autonomous moving robots to support the mobility of the elderly and the disabled in wide-area indoor spaces, and to develop care and household support robot technologies for the socially disadvantaged.

Reference

- Weekly Trend. (2022). Companion robot, solver of human loneliness. July (Week 4). 

People in ICT

"Together, we want to make development fun and popularize AIoT."

Interview | Kim Jun-hyung, SimPlatform Service Development Team Manager



Everyone will remember the Google DeepMind Challenge between AlphaGo and Lee Se-dol, which caused a stir around the world. In the match between the best Go artificial intelligence (AI) program and the best Go player, some focused on who would win or lose the game, and some were amazed by Lee Se-dol's skills, but others began to pay attention to the world of AI beyond that.

Let's hear the story of Kim Jun-hyung, who will work hard until the day when all companies in Korea can use the industrial AIoT service easily and comfortably.

Q

Hello, please introduce yourself to our readers.

Hello, my name is Kim Jun-hyung of the SimPlatform Service Development Team. I am in charge of front-end development.

Q

What kind of work are you in charge of at SimPlatform?

I am in charge of cloud service front-end development. We are working hard to make it easier for users to use our cloud platform.

Q

What are the main services of SimPlatform?

Our main service is Nubison AIoT. AIoT is a concept that combines artificial intelligence(AI) and the Internet of Things(IoT). Our Nubison AIoT service provides data via SaaS(software as a service) collected at industrial sites, that is, industrial AIoT analyzes and utilizes industrial data.



(Source: SimPlatform official website)

Q

What are the areas of application of Nubison?

Our Nubison AIoT service can easily provide quality optimization, failure prediction, and intelligent services for facilities and equipment in various fields. Our services are widely used in manufacturing, logistics, infrastructure, public services, and healthcare.

Q

Is there any particular reason for you to become interested in the area of ICT, such as AI and IoT?

I don't know much about Go, but I became interested in AI while watching the game between AlphaGo and Lee Se-dol. As I was developing the service, I was wondering if it might be possible to discover a certain pattern through machine learning using data accumulated over time — for at least a month or several years. That's what I thought. And what if the user could see the pattern? I became interested while imagining that.

Q

Could you tell us the top three prides of your company?

I believe that our employees, with their excellent development capabilities and creative ideas, are our biggest pride. Second, we are proud that we are a company with technological differentiation great enough to hold numerous patents in the industrial AIoT field and receive several ministerial commendations. Lastly, I would like to point out that ours is the first company in the industry to receive ISO certification.

Q

Are there any memorable episodes that you have from your work?

I remember that a factory owner once praised us for the numerous benefits they realized from our AI image-reading service that identified defective products in advance of delivery by their factory.



What kind of employee would you say you are?

Since the early days of service development, there have been many ups and downs, but I think I have been able to come this far without any problems because of my colleagues who are so collaborative. In the future, I want to be remembered as an employee who can collaborate and develop together in a fun way.



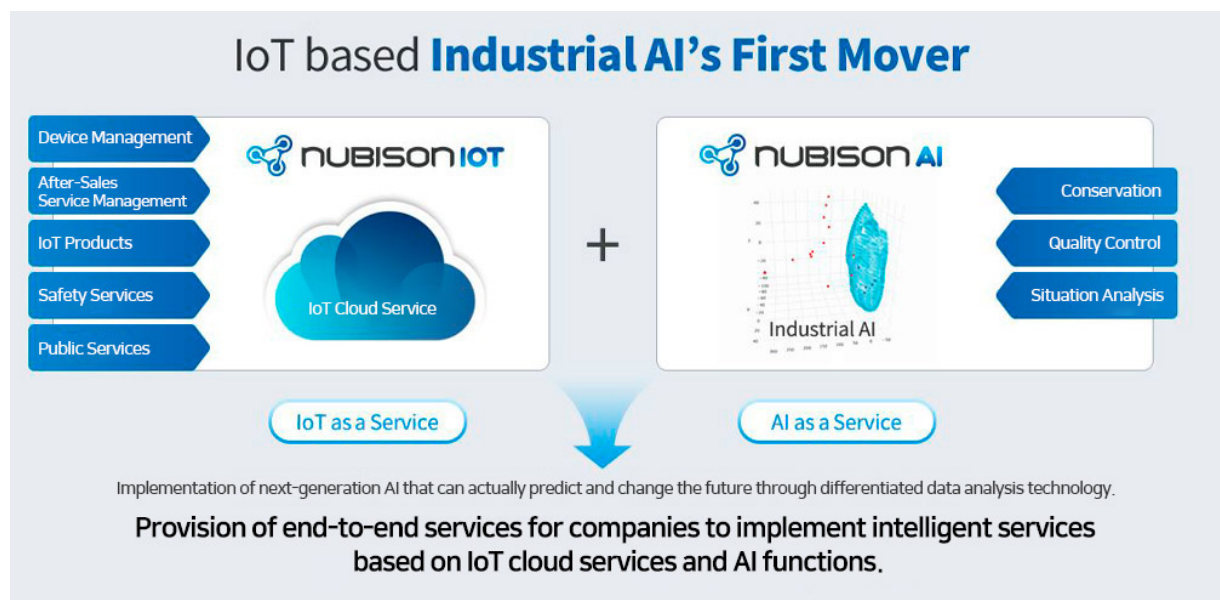
What competencies does an individual need to have to join SimPlatform?

There are many competencies that a developer should have, but I think collaboration and communication skills are the most important. Anyone with whom we can work and develop together in a fun way is always welcome.



What are your future goals?

There are many general users who know about IoT, but what about AIoT? Based on the IoT platform service, I would like for our AI solutions to be widely used, so that many general users can use AIoT with ease.





Do you have any words to convey to our ICT Industry Hot Clips readers?

We hope that you are interested in our Nubison AIoT service from SimPlatform! We will work hard until the day when all Korean companies can easily and conveniently use industrial AIoT services!

ZOOM IN - I

Realizing social value and bridging the digital information divide with barrier-free technology

MULTICS CO., LTD. Kim Jeong the head of a corporate research institute



MULTICS CO., LTD.

General Status

- **Implementing Agency**
National Information Society Agency
- **Business Details**
Diffusion of intelligent information service

Company Status

- **CEO**
Yoo Seung-soo
- **Business Type**
Software development and supply
- **Year of Establishment**
2011. 11.
- **Homepage**
<https://www.multics.kr/>

☑ Key Accomplishments

With AI-based motion recognition and natural language processing technology, contribute to eliminating barriers to access digital information for the socially vulnerable class and expanding opportunities for social participation through development of a Korean ↔ Korean sign language translation solution [Korean ↔ KSL (Korean sign language) translation solution].

Development and provision of KIOSK 'Nuri View', a smart barrier-free info. kiosk for civil (services) affairs.

Developed 'Nurion', a smart barrier-free civil affairs-handling system.

Digitally vulnerable class who are enduring inconvenience due to the growing digital transformation divide



Due to the recent 4th Industrial Revolution and COVID-19, digital transformation is ramping up in society overall, while social and economic inequality and discrimination against the digitally vulnerable class with poor capability to access and utilize digital information due to aging and physical disabilities are worsening. With the central government and municipalities incorporating digital inclusion as a major ICT policy to bridge the digital divide, the development and dissemination of information devices with barrier-free technology is gaining traction.

Accordingly, Multics is providing Korean-sign language conversion solution technology-enabled automated information terminals (kiosks) to Daejeon and Seoul metropolitan-affiliated agencies, public organizations, and public transportation. Starting with the rollout of hospital-based kiosks, the market is on track to expand into the private market.

Incorporating sign language to kiosks



Multics has developed a barrier-free kiosk that translates and provides sign language into images for the website of public institutions for the first time at home and abroad. The barrier-free kiosk provides information to the socially vulnerable class, such as the elderly and those with disabilities, as a custom-tailored communication method through voice or Korean sign language.

As such, the vision of Multics is to create social value through the convergence of human communication technology information such as voice, gesture, and language with smart information technology such as AI and ICT. To this end, we are contributing to bridging the information divide by facilitating communication for the hearing impaired, the socially vulnerable class by recognizing the hand gestures of Korean sign language through artificial intelligence and developing conversion technology that applies natural language processing and Korean sign language image conversion.

The main business lines are 'smart barrier-free service' and 'content development' for the socially vulnerable class. Based on motion/ voice recognition and natural language processing technology, 'Nuri View', we have developed a smart barrier-free info. kiosk for handling civil affairs, and 'Nurion' for civil services (affairs) handling, a smart chatbot 'Nuribot', and a Korean sign language e-book 'Nuribook'. In addition, we developed VR/AR contents and provide brain wave-based cognitive training, as well as educational and academic information.

Barrier-free info. kiosk for communication anytime, anywhere

Multics will participate in the ICT fund project as a 'smart service provider for civil services (affairs) handling for the socially vulnerable class' together with Daejeon Metropolitan City in the 2021 smart informatization project to resolve social issues.

Through our participation in the project, the digitally vulnerable class, such as the elderly and the visually impaired, can avail of the barrier-free info. kiosk as a means of communication anytime and anywhere at their convenience, and benefit from our civil affairs-handling service that allows them to write and apply for civil services (affairs) and check the status of the processing.

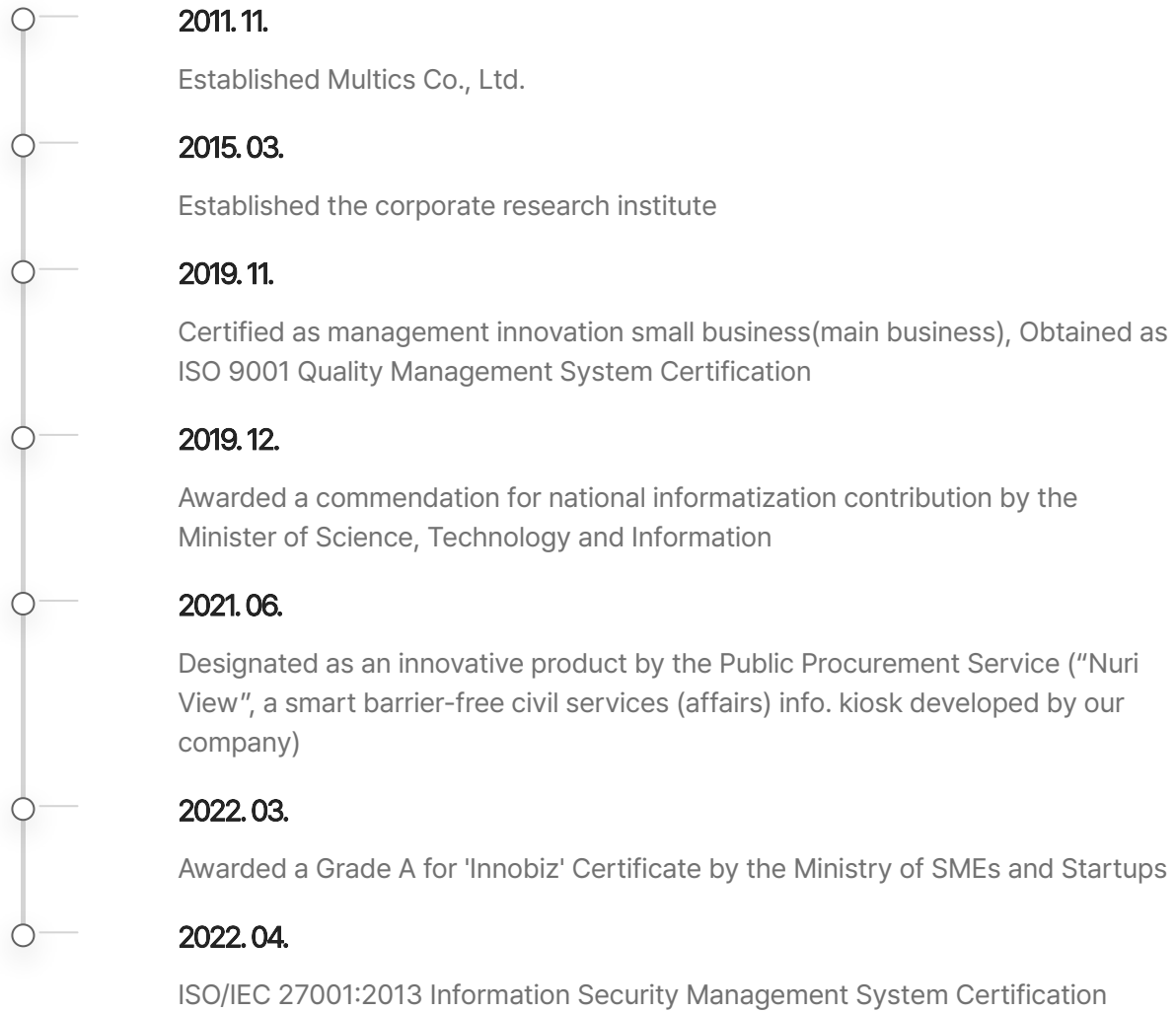
For this purpose, voice recognition and Korean sign language synthesis, gesture recognition and sign language image synthesis, and a height-adjustable screen were provided for the elderly and those with disabilities. In addition, the 7 most common types of civil services (affairs) application forms were created interactively through Korean sign language, voice and touch input, and capable of being processed in connection with government administrative systems such as Public My Data and the Saeol Administrative Information System. As of 2022, it is being installed and operated in 8 venues including senior welfare centers, institutions for those with disabilities, libraries, and community welfare centers. A survey showed that most users were satisfied with the system, and we successfully undertook the project, as shown by requests to expand usable forms and installation locations.

At the forefront of developing technology and content for the socially vulnerable class

Until now, technology and services in the domain of social value have been led by the public sector, followed by the private sector. But now, the digital acceleration of the AI-driven Industry 4.0 is quickly gaining traction and being implemented in both public and private sectors. Thus, government agencies, public institutions, and businesses must always keep in mind that the digital divide of the socially vulnerable class is increasingly widening as well. Therefore, for Multics, this project is highly valued as vindication that 'technology and content for the socially vulnerable are sufficiently competitive in the market and can be profit-generating'.

Based on the achievements under the ICT fund project going forward, Multics is fully committed to developing inclusive technology to bridge the digital information divide of the digitally and socially vulnerable class. Through our smart barrier-free technology, we will garner attention at the forefront of resolving the structurally rooted inequality and discrimination against the socially vulnerable class attributed to the digital information divide.

TIME LINE

- 
- 2011. 11.**
Established Multics Co., Ltd.
 - 2015. 03.**
Established the corporate research institute
 - 2019. 11.**
Certified as management innovation small business(main business), Obtained as ISO 9001 Quality Management System Certification
 - 2019. 12.**
Awarded a commendation for national informatization contribution by the Minister of Science, Technology and Information
 - 2021. 06.**
Designated as an innovative product by the Public Procurement Service ("Nuri View", a smart barrier-free civil services (affairs) info. kiosk developed by our company)
 - 2022. 03.**
Awarded a Grade A for 'Innobiz' Certificate by the Ministry of SMEs and Startups
 - 2022. 04.**
ISO/IEC 27001:2013 Information Security Management System Certification

ZOOM IN - II

Agricultural Village Mobility Safety Platform Created with ICT Technology Innovation

DANUSYS CO., LTD. LEE SANGJUN Director General



DANUSYS CO., LTD.

General Status

- **Implementing Agency**
National Information Society Agency
- **Business Details**
Smart village diffusion and spread

Company Status

- **CEO**
Kang Won-ho
- **Business Type**
Software development and information & communication business
- **Year of Establishment**
2002. 10.
- **Homepage**
<http://www.danusys.com/>

Key Accomplishments

Cloud computing-based CCTV integrated control solution.
GIS-city big data analysis-based smart city integrated platform and service solution.
Customizing capability to quickly respond to various customer needs.

Resolving Agricultural Village Traffic Safety Loophole with Smart City Technology

There are limitations in preventing accidents on the roads of agricultural villages due to many hills and sharp curved roads. When an agricultural village mobility* traffic accident occurs, fatality rate is very high because quick response is almost impossible. The reason is that an accident can be difficult to identify. In reality, agricultural village mobility traffic accidents' death rate is 8-fold higher than that of general traffic accidents. Total cost per agricultural machine accident is KRW 137 million, which is 4 times higher than farm household income. The agricultural village mobility accidents have direct impact on farmers' lives and properties.

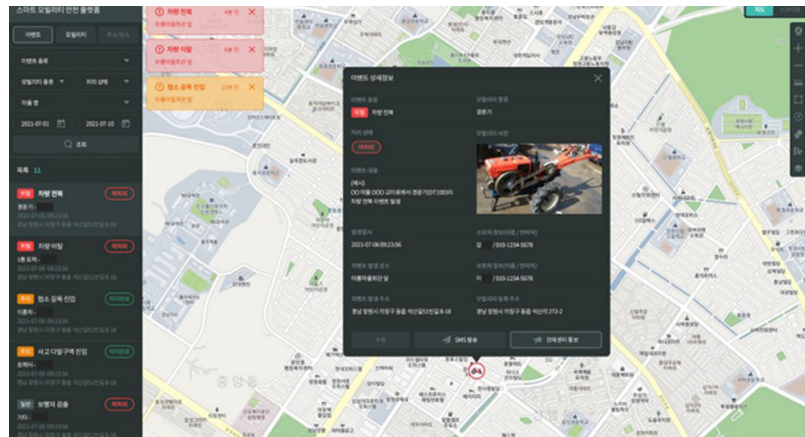
Since the Ministry of Land, Infrastructure and Transport (MOLIT) launched diffusion of a smart city integrated platform in 2015, the smart cities have spread, centered on CCTV integrated control centers within local governments. However, they were concentrated in large cities and city centers due to limitation of resources; therefore, dead zones including mountainous, agricultural, and fishing villages, where social safety net benefits are not sufficiently received, existed. According to the 3rd Smart City Masterplan (2019-2023) released by the MOLIT in July 2019, various efforts have been attempted to resolve local issues and improve living conveniences through step-by-step differentiated approach for city growth.

Danusys Co., Ltd. participated as part of Changwon City Consortium in the Smart Village Service Discovery and Demonstration project, which is an ICT Fund project. The company shaped an emergency rescue system to quickly respond to agricultural village mobility traffic accidents by laying the technical foundation needed to resolve agricultural villages' traffic accident dead zones. It accomplished this by constructing an agricultural machine precision location information-based mobility safety platform.

* Agricultural village mobility: Collectively refers to agricultural village transportation means such as cultivators, tractors, 1-ton trucks, motorcycles, combines, rice planting machines, and MTVs



Construction of a System to Cope with Cutting-edge ICT Convergence-based Agricultural Village Mobility Traffic Accidents



Danusys has focused on innovatively reducing the fatality rate of secondary accident casualties and injury seriousness caused by agricultural machinery, and on the business constructing social safety net of the agricultural villages alienated by ICT technology adoption.

Danusys understood agricultural village roads' characteristics through onsite investigation to secure development service's sustainability and accurately identified agricultural village residents' inconveniences. In the service discovery-actualization-operation phases, the company actively collected residents' requirements through living lab mode, and has been making an agricultural village mobility traffic accident coping system based on cutting-edge ICT convergence in which IoT sensors and AI analysis algorithms are combined.

Danusys has developed a mobility safety platform through which massive amount of data generated in real time from various facilities and sensors can be systematically integrated and managed through linkage measures with relevant organizations such as Changwon City, Fire stations, and village centers and has constructed a mobility control center. The constructed system can support more effective onsite response to be made, as accident scene's topographical characteristics can be grasped fast with linkage with a 3D map.

As a result of an offline questionnaire survey targeting 52 Farm Navi-installed residents for one month after the service launch, 125.3% of higher user satisfaction compared to target goal was obtained. The real time accuracy of the Farm-Navi obtained 300% higher performance, and smart CCTV vehicle recognition AI's accuracy was 102.5% higher compared to target goals, respectively; therefore technical verification on the sensor technology was completed.


Danusys could contribute to new market creation in the agricultural village mobility safety field beyond existing smart city through smart village mobility safety service discovery and demonstration via the project.

Participation in the Physical Security Integrated Platform Linkage Factors Technology Development of Smart Villages

The achievement of the project was connected to the opportunity to take part in the Contactless Service Physical Security Integrated Platform Operating System Development project organized by the Institute of Information & Communications Technology Planning & Evaluation. Danusys's experience and achievement obtained from the ICT Fund project were recognized, so the company took charge of the Smart Village Physical Security Integrated Platform Development sector among major environments in the five sectors. Danusys plans to carry out discovery and definition establishment of physical security integrated platform linkage factor technology suitable for village environment clearly different from large cities.

The common factor technologies that can connect data between various sensors and platforms and internal standard system and standards obtained by Danusys through the project enhances expandability on the diverse services development through collaboration with other companies. All this can be the foundation of numerous services development helping citizens' quality of life improvement.

TIME LINE

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- 2002. 10.**
Established Danusys Co., Ltd.
 - 2011. 10.**
Designated as an excellent product by Public Procurement Service (image monitoring device)
 - 2014. 09.**
Certified as an outstanding company for job invention reward
 - 2014. 11.**
Received an NIA's Commendation (contribution to the efficient operation of CCTV integrated control center)
 - 2015. 03.**
Designated as an excellent product by the Public Procurement Service (object recognition-possible CCTV using background modeling)
 - 2016. 12.**
Posted KRW 11 billion in sales
 - 2017. 05.**
Certified as an INNO-BIZ
 - 2017. 09.**
Selected as an export voucher project support company
 - 2019. 07.**
Chosen as an excellent company in creating jobs
 - 2022. 03.**
Obtained technology evaluation grade T2

ZOOM IN - III

Leading Green Growth with Carbon Neutrality Analysis Big Data Platform

YT (YOUNG THINK) CO., LTD. CEO Hong Yun Taek CEO



YT (YOUNG THINK) CO., LTD.

General Status

- **Implementing Agency**
National Information Society Agency
- **Business Details**
Cloud computing industry nurturing

Company Status

- **CEO**
Kim Yong-tae, Hong Yun-taek
- **Business Type**
Software development and supply
- **Year of Establishment**
2011. 01.
- **Homepage**
<http://www.youngthink.co.kr/>

Key Accomplishments

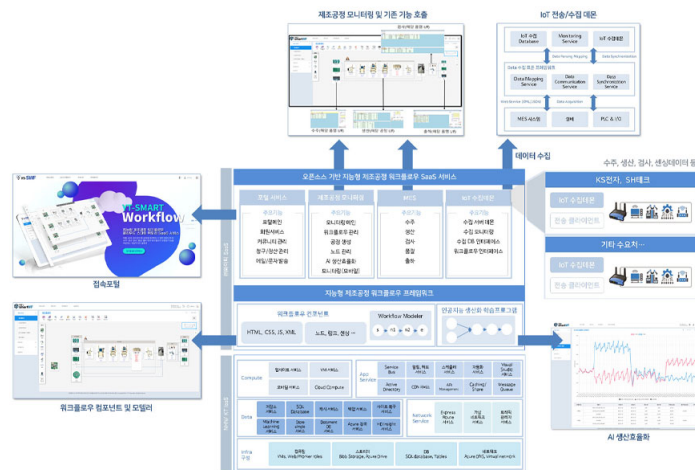
Using and applying YT-SWF (smart workflow) to processes in all business areas.
Commercialized AI safety management solution (YT-AISafer) combining YT-SWF solution and AI, and AI distribution and logistics solution (YT-PlanoBot).
Cloud-based services for YT-SWF, YT-AISafer, and YT-PlanoBot.

IT Small Hidden Champion Company Leading the Fourth Industry

Established in 2011, YT Co., Ltd. constructs smart business models through hyper-connection and hyper-intelligence in line with the Fourth Industrial Revolution and boasts our self-developed solutions such as YT-SWF, YT-AISafer, and YT-PlanoBot. YT is a small hidden IT leading company that has accumulated AI, big data, and IoT core technologies by actively participating in the R&D business. Our company boasts remarkable achievements by entering extensive domains such as public, distribution, logistics, manufacturing, and safety.

YT provides SI, SM, big data, PMS solutions and ERP service in the public sector, and supplies IoT modeling and monitoring, AI safety management, AI distribution and logistics management, food materials distribution ERP services in the manufacturing, distribution, and logistics domains. In this way, our company duly performs corporate activities with utmost professionalism.

Smart Workflow Solutions with Outstanding Technological Capabilities



The main technologies at YT include IoT modeling and monitoring tool YT-SWF (smart workflow solutions)-enabled YT-AISafer (AI safety management solution), and YT-PlanoBot (AI distribution & logistics solution). YT-SWF is a solution providing a sensory and work information-integrated monitoring functions collected through standard interface at the smart factory, as well as offering AI production scheduling.

YT-AISafer, which is a safety management solution used for industrial sites, hospitals, and sanatoriums. This is an optimal AI solution that can prevent accidents such as injuries from a fall, fire, and non-compliant actions in advance by synthesizing camera footage information and diversities of IoT sensor information.

YT has also entered AI distribution and logistics solution development. The AI distribution and logistics solution called YT-PlanoBotis a next-generation futuristic solution enabling real-time inventory management in linkage with the existing YT-SWF using autonomous driving technology-enabled visual information. YT is predicted to accomplish strong performance in the safety and distribution and logistics domains through YT's cutting-edge AI technologies.

Corporate Competence Upgrade through Participation in the ICT Project



YT with excellent technological capabilities and optimistically strong prospect began to develop the YT-SWF solution, so that the smart design platform operated by the Korea Institute of Machinery and Materials can be used in more universal industrial domains. Our company has developed a successful service model in collaboration with the Ministry of Science and ICT and NAVER Cloud, and gained certification.

YT, which has succeeded in developing a new solution through our top-notch know-how and expertise, boasts positive PR impacts by launching and commercializing the YT-SWF Cloud service.

YT has been performing business in the public sector so far, and our company plans to expand its business domain into the corporate sectors including manufacturing, distribution, and logistics through our participation in the ICT Fund project. YT has gained a synergy effect through proactive PR and marketing activities by NIPA and YT through the ICT Fund support.

Developing Our Company through Synergy between Technological Capabilities and PR activities

YT understands that the key to our achievement through the ICT Fund is in part thanks to the Ministry of Science and ICT and National IT Industry Promotion Agency that selected us as a top-performing company. Based on our know-how and expertise built up by performing various businesses, our company evaluates that new solutions are created through gathering the creative ideas of developers.

Considering that YT was selected as a top-performing company based on our participation in the ICT Fund project, we are duly committed to accomplishing new milestones and results in diverse domains targeting many companies ongoing and seamless technological upgrade. YT plans to maximize our sales with ramped up PR activities of the YT-SWF solution provided with the support of ICT Fund, and also plans to attract new investments for the YT-AISafer and YT-PlanoBot, featuring AI technology, and to be listed on the stock market. According to an YT official, we, including junior entrepreneurs, will relentlessly pursue R&D activities and achieve tangible performance, leveraging an opportunity like the ICT Fund project.

TIME LINE

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- 2011. 01.**
Established YT Co., Ltd.
 - 2012. 02.**
Founded the YT-affiliated research center
 - 2012. 03.**
Certified the venture business Signed agreements for public corporations' categorized accounting, financial plan, and financial risk solutions including the Korea Racing Authority and Korea Southern Power
 - 2013. 08.**
Supplied business management solutions to public institutions such as the National Research Council of Science & Technology, KEIT, National Institute for Mathematical Sciences, and Small Business Market Promotion Corporation
 - 2016. 10.**
R&D of big data and smart design platforms with the Korea Institute of Machinery & Materials
 - 2017. 02.**
Developed distribution ERP and online mall solution
 - 2019. 03.**
Started R&D of AI Signed an agreement to advance the big data common- based platform of government integrated IT center
 - 2021. 01.**
Gained MAIN-BIZ Intelligent manufacturing process workflow SaaS development and commercialization project selected

ZOOM IN - IV

Shall We Enjoy Performances Using AI in the Metaverse Space?

EMOTIONWAVE INC. Saint Park CONTENTS TEAM LEADER



EMOTIONWAVE

EMOTIONWAVE INC.

General Status

- **Implementing Agency**
National IT Industry Promotion Agency
- **Business Details**
Reinforcement of next-generation Internet business competitiveness

Company Status

- **CEO**
Jang Soon-chul
- **Business Type**
ICT convergence service and the web/web solutions
- **Year of Establishment**
2011. 07. 04.
- **Homepage**
<https://emotionwave.com/>

Key Accomplishments

Launched AI music educational platform "Mew" in the EduTech market.

Succeeded in developing a metaverse music NFT platform with a metaverse music festival to be scheduled.

331.8% sales increase year-on-year.

Now Music Performance Is Enjoyed with Metaverse



AI-enabled music performances are emerging at a fast pace, as metaverse and digital human technology are fused together. AI is used even in the sampling and home recording sectors. An AI tool can carry out the whole process in which a song is completed in view of designating an app automatically creating lyrics and setting chords, and adding musical instrument sounds.

Emotionwave has developed a custom-oriented AI music concert service for public and complex cultural spaces. Four digital humans are currently engaged in the music platform and broadcasting websites. The company has created new characters with unique dispositions and features. Emotionwave constructed a formal process creating a music source best-suited for each person concerned and officially releasing it through composition by the base genre. The company's source technological capabilities and planning competence that can be combined with technology or arts-enriched businesses, along with industries expected to create competitive values in the existing content and IP licensing markets.

Connecting Digital World with Analog World



Emotionwave is a venture company established in 2013 to make a world where anyone can become a creator through innovative technologies and services through the convergence of arts and technology. The company is creating a new market with its belief that the future-era technology can connect human's heart and emotions, let alone serve to solve problems, and that the digital world is connected with the analog world, which can move the human heart.

Emotionwave has numerous Korean and international patents, centered on metaverse-based virtual convergence, AI music, IoT, and blockchain NFT technologies. The company is simultaneously performing AI Ed-tech and music metaverse NFT platform businesses.

On the heels of Emotionwave's success in 5G communication module development for AIoT robotic musical instrumental performance in December last year, the company is equipped with AI music concert service conditions to offer the service to customers in the wireless environment. Through this, Emotionwave has its sights set on business expansion. With music metaverse NFT platform development with which customers can perform or watch on and offline performances in the metaverse space, Emotionwave exerts concerted efforts to pursue diverse businesses expansion targeting B2C and B2G markets, as well as the generation MZ market. The company also plans to host a metaverse festival using large IP.

Remote Communication Performance Arena "K-Digital Stage"

Emotionwave showcases an ICT platform that has been developed through the ICT Fund Project in the market. The contactless AIoT music performance arena, K-Digital Stage, that is participating in the ICT Fund project is a platform where AI, IoT, 5G, XR, and robotics technologies converge. The platform can be applied in either a contactless or face-to-face environment through digital twin, and allows for music appreciation in diverse genres, performance experiences, and ensemble/ accompanied performance services.

Remote communication and performances are possible being accompanied by real artist's commitment-type video media, so futuristic music technology, experience, and value are offered. Moreover, real-time monitoring and video footage control, AI robot's musical instrumental performance and stage management, and fire/ electric management can be undertaken remotely; therefore, as an unmanned, automated platform, it can be easily and conveniently used without a manager being stationed. Revenues are growing by being adopted to various forms of offline channels, such as large retail stores, hotels, and family cultural spaces.

Emotionwave has been striving for source technology R&D in which technology and arts are converged from the pre-mature stage of its establishment, but there were many challenges, because the market demand and technical conditions were not supported to create viable businesses back then. At the cusp of the contactless and metaverse era aligned with 5G communication development, generation MZ-led media use diffusion, and the impact of the COVID-19 pandemic, related market demand has gradually grown due to the trend of freely expressing oneself in the virtual/ digital space. As such, Emotionwave's business has rapidly gained traction, as market demands and technical conditions have aligned closer.

Emotionwave aims to enter the U.S., Europe, and ASEAN in the second half of the year, based on its achievements. The company plans to develop the platform as one that can effectively introduce Korean contents including K-pop and Korean traditional music and that can exchange with foreign contents as well.

A World Where Anyone Can be a Creator

The core value proposition of Emotionwave's platform entails that anyone can become a creator. To this end, contents and ecosystem should be made in harmony together with many musicians, broadcasting, and entertainment players. To do so, a virtuous cycle of experience-education-growth-business should be completed in the K-Digital Stage, allowing many people to experience a new platform, grow by learning about it, and use it for income-earning activities. Emotionwave focuses on the state-of-the-art trend technologies and demand to secure more users going forward.

TIME LINE

