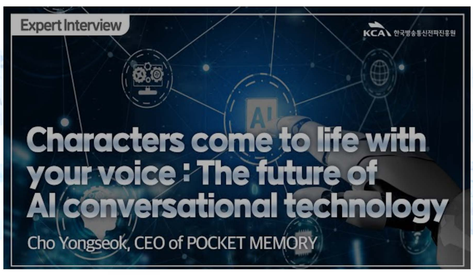
Expert Article

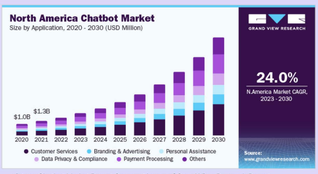
Characters come to life with your voice : The future of AI conversational technology

Cho Yongseok, CEO , POCKET MEMORY

#Chatbot marketplace #AI conversational technology #Ötzi character #Closed domain #Omnichannel



Intro :



picture: Chatbot Market Report Sources : Image of Grand View Research Report

1. Chatbot marketplace, Beyond saturation, new challenges and opportunities

The chatbot market is exploding and approaching saturation. However, a new challenge has emerged: improving the user experience. Speech recognition and character-based conversational technology are emerging as key technologies to address these challenges.

2. Pushing the limits of text-based chatbots

Traditional text-based chatbots can be frustrating for users and are limited in their ability to convey information. Speech recognition and character-based conversational technologies have the potential to overcome these limitations and revolutionize the user experience.

3. Interesting question: How will speech recognition and character-based conversational technology change the chatbot market?

In this feature, we explore

How can speech and character technologies transform the user experience?

How can these technologies be of use in different sectors?

What's the future for chatbots?

Speech recognition and character-based conversational technology is an effective way to transform the user experience.

Modern speech recognition technology is more than 95% accurate, and advances in natural language processing (NLP) have made it possible to understand user intent more accurately. For example, Microsoft Azure's multilingual speech recognition technology supports multiple languages and dialects, making it more accessible to users around the world.(Source: Microsoft Azure).

Pokémon Memory's AI interactive character solution builds on these technological advances. We use deep learning-based NLP to pinpoint user intent and deliver immersive experiences through a variety of characters. This personalized experience also allows us to deliver more relevant conversations and information to our users.

Criteria	Open Domain	Closed Domain
Dialogue Range	No constraints	Limited to specific topics/areas
Examples	Casual conversations, news articles, books	Customer service inquiries, medical consultations
Advantages	Natural conversations, diverse information	Precise and specialized information
Disadvantages	Difficulty ensuring information accuracy	Limited scope of conversation
Technology	Large Language Models (LLM)	Rule-based systems, Natural Language Processing (NLP)

In particular, Pocket Memories provides a new level of user experience through the convergence of closed and open domain conversation systems. Closed domains are systems that handle conversations that are limited to a specific topic or field, and are optimized to deliver accurate and reliable information. Open Domain, on the other hand, is a system that allows conversations on an unlimited variety of topics and is based on natural language processing technology (Large Language Models, LLM). Pocket Memories' AI conversational character solution provides users with accurate information through closed domain, while still having the flexibility to respond to broader questions through open domain conversations. This innovative approach provides users with a richer, more colorful conversational experience and opens up new possibilities for chatbot technology.

The benefits of speech recognition technology include allowing users to converse naturally without typing, providing information accessibility for the visually impaired, and enabling chatbots to perform a variety of tasks. Disadvantages include reduced accuracy in noisy environments, possible leakage of voice data, and technical limitations. Nevertheless, the technology offers the convenience of being able to get information or carry out commands while doing other activities, such as driving or cooking.

Character-based conversational technology engages users and effectively communicates complex information with visuals. This is particularly effective in the education space to increase learning effectiveness, and can be seen in learning platforms like Duolingo (Source: Duolingo).

How can these technologies be utilized in various fields?

Speech recognition and character-based conversational technologies have innovative uses in a variety of fields. Around the world, characters powered by natural language processing are enriching user experiences in education, customer service, entertainment, and more.

Global practices

Education Sector : Language learning apps like Duolingo use friendly characters to help users learn a new language. These characters send encouraging messages or help set learning goals based on the learner's progress.

Customer service: Many businesses are adopting AI chatbots to respond to customer inquiries. Character-based conversations add personality and friendliness to customer interactions and improve customer satisfaction.

Entertainment: In the movie and gaming industries, users interact with virtual characters to enjoy new experiences. These interactions make storytelling more immersive and drive user engagement.

(picture) Ötzi NLP-based AI character Source: Jeonbukseon History Museum

The case of Pocket Memories

PocketMemory is revolutionizing the user experience by utilizing its AI characters in a variety of fields, including education, public relations, and entertainment.

Ministry of SMEs and Startups Regulatory Free Zone Promotional Character : Utilize promotional characters to convey various policies and information of the free trade zone to citizens in a friendly and easy-to-understand manner. This character responds to questions about policies and provides information about the various projects taking place within the SEZ.

Monk Hyecho, Ötzi character : The project, which aims to introduce cultural heritage and educate about history, uses characters such as Monk Hyecho and Ōchi to convey historical knowledge and stories to users. These characters tell stories about historical people and events in a fun and educational way, enriching the user's learning experience.

What does the future hold for the chatbot market?

The chatbot market is expected to contribute to building a more convenient and efficient future society by developing chatbots with human-like conversational abilities, providing personalized services, integrating various channels, increasing the use of chatbot analytics, and strengthening security and privacy. These revolutionary changes offer new opportunities for both businesses and users, and continued technological advancements and improvements in user experience will drive sustainable growth in the chatbot market.

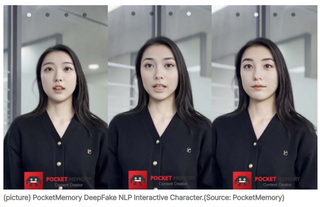
In particular, the government is supporting the development of technologies such as artificial intelligence through ICT funding programs, which is a great opportunity for companies to develop innovative chatbot solutions to enhance their market competitiveness. Throughout 2022 and 2023, the ICT Fund project will provide PocketMemory with the opportunity to develop innovative AI conversational solutions for market needs with government support.

Key trends and implications

Technological advancements: Advancements in NLP and LLM technologies have enabled chatbots to provide natural conversations and provide accurate answers to user queries. This has led to increased user satisfaction and customer retention. Combined with digital humans, this makes for more realistic conversations.

Businesses are increasingly adopting chatbots: The use of chatbots in a variety of sectors is on the rise, providing significant benefits to businesses through cost savings, increased efficiency, and the potential for 24/7 customer support.

Increasing consumer preference: The increasing prevalence of mobile devices and the convenience of using chatbots is driving consumer preference for chatbots. This is contributing to time and cost savings.



(picture) PocketMemory DeepFake NLP Interactive Character.(Source: PocketMemory)

Omnichannel and AI-powered chatbots: The use of omnichannel chatbots, which provide a unified chatbot experience across multiple channels to drive user convenience and customer engagement, and AI-powered chatbots, which enable more human-like conversations, is on the rise.

Implications of market growth: The growing chatbot market offers organizations an opportunity to gain a competitive advantage. Chatbots can reduce costs, increase efficiency, and improve customer satisfaction, and it's important to focus on advancing the technology and improving the user experience.

Looking to the future

The chatbot market is expected to contribute to building a more convenient and efficient future society by developing chatbots with human-like conversational abilities, providing personalized services, integrating various channels, increasing the use of chatbot analytics, and strengthening security and privacy. These revolutionary changes offer new opportunities for both businesses and users, and continued technological advancements and improvements in user experience will drive sustainable growth in the chatbot market.

Reference

-(Market Research), Grand View Research
-(Domain-specific interactive interface) :Gartner†source
-Forrester: The State Of Chatbots And Virtual Assistants In 2023,
-Chatbots and virtual assistants
-Duolingo
-Conversational AI and Virtual Assistants segment

Future Media Industry Trends Powered by AI and Digital

Advances in AI technology are transforming the media industry. By applying machine learning and natural language processing technologies, media companies are increasing efficiency and developing new business models for content creation, editing, and distribution. The use of AI technology is expected to revolutionize the media industry and is attracting increasing interest and investment.

#AI #AI voice #De-aging technology #Interactive audiobooks #Metaverses

AI market size forecast

The global artificial intelligence (AI) market is expected to grow at a CAGR of 38.4% through 2025 to reach $184 billion (USD 204 trillion).

In addition, global market research firm Markets & Markets predicts that the AI market will grow from $86.9 billion to $407 billion from 2022 to 2027, at a compound annual growth rate of 36.2%. According to another report, the market size of the AI industry is expected to be more than 4.6 times larger than it is today by 2027, which means a compound annual growth rate of 72%.

South Korea's AI market grew from 1 trillion won in 2018 to 1.5 trillion won in 2019, and is expected to grow at a CAGR of 38.4% to reach 10.5 trillion won by 2025.

Media industry utilizing AI voice

Source: ClipartKorea

1. personalized news service

News applications that use AI voice technology analyze users' preferences and previous consumption patterns to deliver personalized news content. This makes it easier for users to find news that matches their interests, and AI is constantly learning your preferences to provide more accurate recommendations.

News organizations like the Associated Press (AP) have implemented systems that use AI to automatically write stories about sports news and corporate earnings.

Data and algorithms can be leveraged to quickly analyze and summarize large amounts of data to create news stories, and guidelines can be provided to the AI to reduce the risk of AI misinformation and improve accuracy.

2. Interactive audiobooks

Interactive audiobooks created with AI voice technology allow users to make choices as the story progresses, creating a unique experience for each user. These audiobooks offer the opportunity to explore different endings and storylines, creating a much richer experience than traditional audiobooks.

NAVER has introduced interactivefairy tales as part of its Clova content service for its AI speaker. The interactive audiobooks offer 20 classic fairy tales familiar to children and give them the opportunity to choose their own actions at key points in the story. This is expected to generate more interest among readers

Source: ClipartKorea

Source: ClipartKorea

3. Create an AI-powered podcast

It uses AI language technology to automatically generate podcasts on topics of your choice. The technology analyses large amounts of data to extract relevant content, which is then used to create new podcast episodes. This allows users to enjoy their own personalised podcasts and content creators to increase efficiency by automating the content creation process.

Wondercraft AI (wondercraft.ai) is a podcast builder that turns your existing content into a podcast. Wondercraft AI uses AI voices to help you create podcasts in minutes. You can create podcasts in a variety of languages and it can replicate real voices to create a more engaging voice.

These are just some of the transformative changes that AI speech technology has brought to the media industry, and the continued development of AI speech technology is expected to play a major role in shaping the future of the media industry.

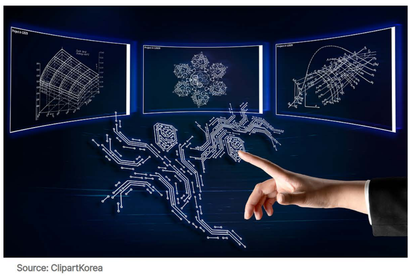
4. De-aging technology

De-aging is a technique that uses visual effects and computer-generated imagery (CGI) to make actors look younger or older than their actual age. It is used in drama and film to make them look more realistic. In recent years, de-aging technology has been combined with AI to simplify existing implementations, making it easier to use for everyday drama and entertainment, whether on TV or OTT.

In the Disney+ original TV series "Casino", actor Choi Min-sik, who is in his 60s, played the character of "Cha Moo-sik" from his 30s to his 60s. The AI-based de-aging technology used in Casino is divided into "face de-aging" and "voice de-aging". Face de-aging is used to correct wrinkles and skin tone, while voice de-aging is used to create voice samples for each age group, enabling the actor not only to sound like a younger version of himself, but also to act fluently in foreign languages.

Use of GPT4

AI media technologies and metaverses



Source: ClipartKorea

AI media technology, combined with spatial computing and convergence, is expected to overcome the limitations of the metaverse and provide new development opportunities. The evolution of the metaverse through the convergence of spatial computing and AI is expected to be divided into "evolution of space", "evolution of devices" and "evolution of economy", with the digital spatial economy emerging as a major economic axis.

NVIDIA's GET3D (Generate Explicit Textured 3D) is an AI model that generates 3D images of buildings, vehicles, characters, and other objects to populate your metaverse. The model can synthesise high-quality 3D polygon meshes of any topology from a single 2D image input.

Get3D can be used to create characters, buildings, cars, etc. for virtual worlds at a rate of about 20 per second, which is likely to help flesh out a metaverse or virtual world for a game.

Reference

-AI and digital announce plans for the future of media
-AI technology takes video content beyond the real world

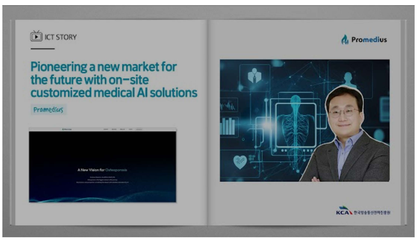
Pioneering a new market for the future with on-site customized medical AI solutions

Promedius | iGiS | samwoo | (주)인코리드

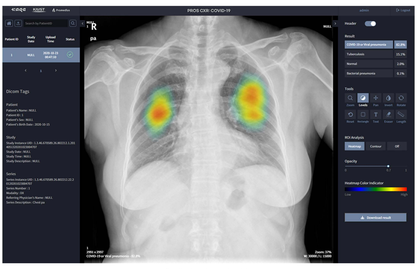
Promedius

Core Technologies and Achievement Highlights

- The world's largest number of solutions for AI-based chest X-ray image analysis
- Technology and business model verified at domestic and international startup pitch competitions
- Improved global medical equality using advanced Korean AI technologies



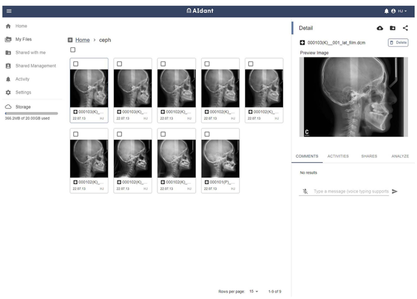
The emerging medical AI market



Chest X-ray Image Interpretation solution

AI technology for X-ray and CT radiology reporting can not only assist medical practitioners in developing countries,but also assist the medical staff in various ways even in advanced countries.According to a recent research,the global medical imaging AI market amounts to USD 2 billion 325 million with an annual growth rate of 57.81%.It is expected that implementation of AI solutions will be accelerated through medical assistance in various countries.Promedius is a next-generation medical AI startup,providing AI solutions that can improve the accuracy of radiology reporting while improving the efficiency of the medical staff.It also offers the cloud-based radiology platform Aidant so that AI solutions can be available for use in countries that lack medical infrastructure.Among many different types of medical images,the company currently focuses on chest X-ray reporting solutions.The company has the largest number of solutions for infectious disease,pneumothorax,and osteoporosis diagnosis assistance.

The ICT Funding Project that made medical AI solutions fly



Aidant: Cloud Medical AI Platform

The AI Voucher Project launched by the National I T Industry Promotion Agency(NIPA)is an ICT Funding Project designed to give an opportunity to medical image data companies with proprietary technologies and solutions such as Promedius to provide customized solutions.The project supports SMEs,venture startups,and large companies that need to implement optimal AI solutions in the shortest period possible and provide an opportunity to SMEs and venture startups who have developed AI solutions and wish to create a new market.To be fair,it was hard for Promedius achieve its goals according to the original schedule because it was established in 2019,right before the COVID-19 epidemic that shook the world.However,the company started focusing on developing diagnosis solutions for infectious disease diagnosis after having participated in a project to develop chest X-ray-based diagnosis solutions for COVID-19 pneumonia with Korea Advanced Institute of Science and Technology(KAIST).A solution was developed while carrying out the project,and Promedius was able to provide the solution to two companies that wanted it through the 2022 AI Voucher Project.These two companies,both of which are in the business of providing picture archiving and communication system(PACS)to hospitals in the country and abroad,plan to provide remote services that can assist diagnosis infectious diseases from a remote place by using PromediusAI solution.Promedius has been constantly generating revenue since actively participating in the AI voucher project.As a supplier for the AI Voucher Project,Promedius supplied to one company in 2021 and two companies in 2022 in 2023,the company is supplying AI solutions to a total of four companies.Of note,the company solves various problems experienced by companies handling medical image data with the AI solution.

Gaining opportunities and trust through the support project

When Promedius was carrying out the support project,it was essential for the company to run a series of tests by linking the AI solution to an actual hospital.There were some technical problems in running the link test,because it was the first time such test was performed in the country.Thanks to the collaborative work with the companies that needed the solution,the problems were solved.The results from the test were above the target level of performance,and the company was able to successfully complete the project ahead of the schedule.Since participating in the AI Voucher Project,Promedius gained an opportunity to collaborate with medical equipment and infrastructure companies both in the country and abroad through government research and development.The company expects 39 sustainable revenue growth by supplying products through such collaborative projects.Its experience of having participated in the support project serves as a reference,which helped the company gain the trust of other companies.This led to the company being consecutively selected as a supplier for the AI Voucher Project.Internally,the company's research staff at its lab obtained patents,published papers,and developed next-generation technologies in the course of participating in the support project.

Highly applicable AI-based radiology reporting solutions

Promedius hopes its AI-based radiology reporting solution to be used in various medical fields.It recently developed a solution that notifies the risk level of osteoporosis based on X-ray images for the first time in the world.Osteoporosis,or porous bone,is a common disease among elderly women.Using Promedius'solution,a chest X-ray is enough to diagnose osteoporosis in the early stage of the disease.This means that patients can start receiving medical treatment in the early stage,and the costs of public healthcare can be reduced.Promedius plans to continue to develop and introduce advanced AI solutions like this and provide medical image analysis solutions that can be applied instantly on medical fields through continuous R&D and commercialization.The company also plans to cooperate with a number of institutes in the Philippines and Thailand so that the infectious disease diagnosis assistance solution that it supplied through the 2022 AI Voucher Project can also be used in the public healthcare sector of developing countries.The company will also contribute to resolving medical complaints by making medical AI more accessible to developing countries through a cloud platform.

ICT Funding Project

- **Dedicated Institution** National IT Industry Promotion Agency
- **Business Objective** Build an infrastructure for intelligence data industry
- **Business Description** High performance computing support

Company information

- **CEO** Bae Hyeonjin
- **Type of Business** Development and supply of application software for the field
- **Year of Establishment** 2019. 09
- **Website** promedius.ai

TIME LINE

2019. 9.
Established Promedius Inc.

2020. 6.
Venture Business Certified

2021. 12.
Won the Grand Prize at the Supernova Solution Platform III in the area of biohealth (Ministry of SMEs and Startups)

2022. 5.
Selected for the SKT ESG Korea 2022 Program
Launched the medical AI platform, Aidant

2022. 10.
ISO13485:2016 인증 획득
Attracted investment for Series A (KRW 2 billion)

2022. 11.
Won the Grand Prize at the 20th World Korean Business Convention in the startup pitch competition
Certified as an exemplary business for rewarding employee invention

2023. 4.
Selected for the 2023 Asan Voyager Program

2023. 5.
Selected as the Finalist at the UN ITU AI for Good Innovation Factory Pitch Competition

2023. 6.
Winner of the GITEX Africa 2023 Supernova Challenge Pitch Competition in HealthTech Category

Promedius | iGiS | samwoo | (주)인그리드

iGiS Co., Ltd.

Core Technologies and Achievement Highlights

- Creation of new service markets in the public sector, such as disaster monitoring using drones, a new technology of the 4th industrial revolution

- Securing domestic and foreign patents and quality reliability with drone software applied with SW convergence technology

- Independent development of the world's only technology that integrates 360-degree drone panoramic images and spatial information

The burgeoning drone industry

Photo of participation at 2023 CES

The drone industry is experiencing rapid growth.According to the 2nd Basic Plan for the Development of the Drone Industry in 2022,the global drone market is projected to grow at a rate of 17.75%annually,reaching a market value of KRW 125.5 trillion by 2030.The domestic drone market is also expected to grow at a rate of 16.07%annually,reaching approximately KRW 2.2 trillion by 2030.A report by Fortune Business Insights titled"Drone Service Market,2022-2029"predicts that the global drone market,valued at KRW 17.8 trillion in 2022,will grow at an average annual rate of 42.78%,reaching KRW 308 trillion by 2029.With the growth of the drone market,a multitude of drone companies are emerging,and the use of drones in various sectors such as delivery,transportation,and surveillance is expanding significantly.However,there are also limitations to consider,such as limited flight time,radio wave restrictions,and the need for skilled operators.Nevertheless,the consensus remains that drones will continue to progress and evolve.

Excellent technological capabilities combining drones and GIS

Among drone companies in Korea,one company is pioneering new markets beyond the limitations of conventional drones.iGiS Co.,Ltd.is leading remarkable growth by merging drones and Geographic Information Systems(GIS).A Geographic Information System is an information system that processes and manages spatially distributed information,also known as geographic information.iGiS provides a solution that combines GIS and drone operation technology,enabling fast and accurate information collection and monitoring.We have developed our own solution that utilizes drones effectively and extensively by integrating spatial information,allowing for the collection,analysis,and visualization of geographic information combined with various drone image data.This solution can be applied in various fields,including disaster monitoring,natural ecosystem observation,and pollution detection,providing diverse services not only to the private sector but also to the public sector.In particular,we have introduced an integrated disaster monitoring system that effectively integrates drone and CCTV images.Currently,iGiS holds 35 domestic and international intellectual property rights related to drone and GIS technology and is expanding its presence in various countries such as the United States,Australia,Vietnam,Mongolia,and Korea,based on its excellent technology.

Development of systems for drone operation and control

Through the ICT Funding Project,focused on the development and commercialization of a software convergence service based on city data,iGiS has made significant advancements in its integrated disaster monitoring system.Additionally,by integrating its self-development panoramic drone platform,the company has established a more efficient drone control system.This project has played a vital role in further enhancing the commercialization capability of iGiS's drone system through the development of drone operation and control technology.Notably,the company has implemented an algorithm for planning efficient flight paths for drones through self-development.As a result,iGiS has achieved a control system that enables drones to cover longer distances in a single flight and collect a greater amount of data.Furthermore,iGiS has recently applied for an international patent(U.S.)for its self-developed'Panoramic Image Provisioning System'.This web-based solution combines spatial information with 360-degree panoramic drone images,making it applicable in various fields.The patent application signifies iGiS's commitment to innovation and opens doors for accelerated entry into the North American market,which holds the largest share in both spatial information technology and drone industries worldwide.

With constant innovation

However,iGiS is not satisfied with its modest achievements.As the drone industry's market continues to grow and the technology application field expands,the development and evolution of accompanying technologies are happening at a rapid pace.To keep up with these advancements and strengthen its competitiveness,iGiS has established a dedicated organization focused on technology research,development,and commercialization.We spare no effort in providing competitive products and services by staying abreast of the latest technology trends and incorporating advanced technologies.Furthermore,as the drone market expands,iGiS plans to expand its customer base.This involves implementing a subscription-based service to establish a stable profit structure for the drone solution platform.By introducing an annual subscription service,we aim to alleviate the initial cost burden for customers who may hesitate to invest in the solution.This demonstrates our commitment and ambition to grow the drone-based service market and drive corporate growth through the launch of various service products.Through continuous efforts and innovation in the rapidly growing drone market,we anticipate outstanding performance from Korean companies equipped with unrivaled technology.

ICT Funding Project

- **Dedicated Institution** National IT Industry Promotion Agency
- **Business Objective** SW convergence cluster 2.0
- **Business Description** SW Convergence Cluster 2.0

Company information

- **CEO** Lee Hodong
- **Type of Business** Application Software Development and Supply
- **Year of Establishment** 2018. 02.
- **Website** http://igis.co.kr

TIME LINE

2018. 2.
Established iGiS Co., Ltd.

2018. 3.
Registered as a venture company by Korea Technology Finance Corporation

2019. 12.
Completed development of the smart drone control system and a solution

2020. 3.
Certification of G-PASS (promising company entering the overseas procurement market)

2021. 12.
Selected for Technology-Recognized Innovative Products (Fast Track 3) - DFOS Solution

2022. 3.
Participated in the World Bank Uzbekistan Landscape Restoration Program

2023. 3.
US Patent Application - Panoramic Image Provision System

Promedius | iGIS | samwoo IMMERSION | (주)인크리드

Samwoo Immersion Co., Ltd.

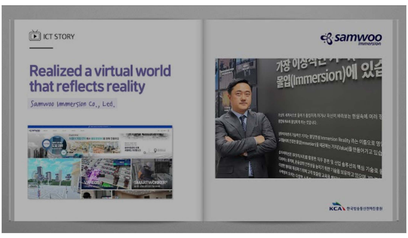
Core Technologies and Achievement Highlights

- Development of IMXR, an integrated XR solution for education and training

- Establishment of the world's first XR-based job training and talent development center

- Development of BEYOND LINK, a Metaverse platform customized for customers
Creation of the SMARTWORKER system, an all-in-one smart remote work support platform

- Development of VARLOS, an XR-based digital twin system



A leading specialized company in digital twin expertise

Display of Samwoo Immersion's 'Building Control Monitoring Digital Twin System'

'Digital Twin'has been selected as one of the top 10 flagship projects in the Korean version of the New Deal,a national development strategy aimed at overcoming the economic crisis caused by COVID-19 and leading the global economy.Digital Twin technology enables the simulation of real-world situations to predict outcomes in advance.Through this technology,various ICT/SW convergence services are implemented and demonstrated in regional applications.Samwoo Immersion Co.,Ltd.is a developer specializing in XR solutions in the industrial field and has developed and supplied XR technology-based solutions for industrial job training and various educational training fields.It is expanding the XR market with a new paradigm of industrial use of VR and AR technologies,which have been specialized in the existing game industry.It also provides'Integrated XR education and training infrastructure'and services through a customized Metaverse platform.Besides these,it has introduced various XR solutions,such as an all-in-one smart remote work support platform,a DT monitoring system with digital twin technology,etc.Since 2013,Samwoo Immersion has been eveloping technology that synchronizes 3D image overlap information and 2D block layout information using location data of blocks.This technology forms the foundation for digital twin technology and enables real-time updates to the database,video information systems,and notification warning app functions.Building upon this,the company has further developed systems that incorporate deep learning-based automatic ship recognition programs and an AI-based vessel collision prevention system(AI-MASTER).These systems enable a smart construction technology safety monitoring digital twin system,ship monitoring digital twin system,terminal monitoring digital twin system,among others.As a result,the company has been expanding its business scope and offerings.

Establishing a multi-use facility management platform

Onsite photo of the Jagalchi Market Disaster Prevention Center

Samwoo Immersion is actively developing various solutions leveraging its proprietary digital twin technology.The company has achieved significant milestones,including the establishment of a real-time safety management platform for Busan Jagalchi Market facilities using 5G-based digital twins.Additionally,it has been working on a facility safety management system in diverse fields that require large-scale facility management.Samwoo Immersion participated in the'Development and demonstration of an Integrated Safety Monitoring Platform for Jagalchi market through convergence of New 5G and Digital Twin-Based technologies and management of distributed data'project.This initiative serves as a foundation for verifying and promoting digital twin solutions and service models.In response to the aging facilities and the need for a disaster response simulation and safety management platform,Busan Jagalchi Market,the commercial district with the highest floating population in Busan,embarked on a project.With the collaboration of Busan Metropolitan City and Busan Infrastructure Corporation,Samwoo Immersion was entrusted to provide support services utilizing a digital twin-based disaster prevention integrated monitoring platform for facility management.The service model was erified through a demonstration.The support services encompass various areas,including water quality management service at the fishery market through seawater quality measurement,specialized services for hazardous substance detection and air quality management through flooding detection service and air quality measurement,as well as fire detection and escape route guidance services.

Realizing the latest digital twin platform through the use of game engines

In the development of the VARLOS'building control monitoring digital twin system,the utilization of various visualization techniques played a crucial role in achieving realistic real-time features.Key aspects included the implementation of Unreal Game Engine's PBR shader,post-processing,and lighting effects.The openness and flexibility of the Unreal Engine allowed for easy expansion of necessary functions and seamless integration with legacy systems that require different communication standards.This enabled the creation of a digital twin monitoring system with integrated AI-based prediction and alert functions.The Unreal Engine's advantages and the development environment it offers have led to its application expanding beyond game development to various content and solution development areas.Developers are increasingly recognizing the powerful functionalities and flexible nature of the Unreal Engine.

Provision of a service that reflects users' safety management needs

To carry out the project successfully,communications with stakeholders were paramount.It was to moothly solve difficulties,such as difficulties in integration for making digital twins due to the aging of existing Legacy systems like CCTV and delays in determining service items due to different opinions of various stakeholders during a short business period.The digital twin integrated safety monitoring platform developed through this project aims to establish an advanced and standardized integrated disaster prevention-oriented model by incorporating valuable feedback from actual users of the service.Furthermore,the accumulation of 5G-based IoT sensor data will enable the implementation of more accurate prediction and alert simulations.This platform will facilitate the provision of various services that were challenging to commercialize in the previous 4G(LTE)environment and contribute to enhancing the overall environment.Ultimately,it will lay the foundation for leveraging accumulated data for even more practical applications in the future.

ICT Funding Project

- **Dedicated Institution** National IT Industry Promotion Agency
- **Business Objective** Expansion of intelligent information service
- **Business Description** Public leading of 5G-based digital twin(NIPA)

Company information

- **CEO** Kim Daehee
- **Type of Business** Manufacturingservice / VRARXR, simulatorsoftware, etc.e
- **Year of Establishment** 2011. 5.
- **Website** www.samwooim.com

TIME LINE

2011. 5.
Established Samwoo Soft Co., Ltd. (Changed company name to Samwoo Immersion Co., Ltd. in 2016)

2013. 3.
Established Research Institute affiliated with Samwoo Emotion Co., Ltd.

2013. 11.
Developed VARLOS shipyard operation monitoring digital twin system

2014. 7.
The 9th Digital Innovation IT/SW Grand Prize (Yankook Ilbo)

2018. 11.
Developed VARLOS safety monitoring digital twin system for smart construction technology maritime construction

2020. 2.
Developed VARLOS terminal monitoring digital twin system

2020. 10.
Developed VARLOS ship monitoring digital twin system

2022. 3.
Opened SWXR CAMPUS, the world's first XR-based job training & talent development center

2022. 1.
Selected as a strategic industry-leading company by Busan Metropolitan City (Busan Metropolitan City)

2022. 11.
Conducted 5G-based digital twin public leading project (Development and demonstration of integrated safety monitoring platform in Jagalchi Market, Busan)

Discovering the answer in digital transformation for manufacturing competitiveness

InGrid Co., Ltd.

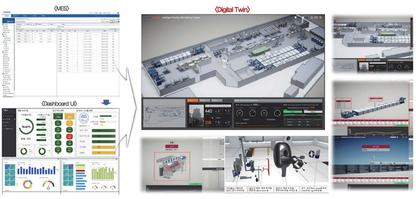
Core Technologies and Achievement Highlights

- Construction of digital twins for large corporations and national research institutes such as POSCO, LG Electronics, Doosan Enerbility, Hanwha, and LIG

- Securing technological competitiveness by expanding from a digital twin platform for manufacturing to a smart city, smart farm, and logistics platform

- Securing a solution that includes real-time monitoring, simulation, and control functions using digital twins

Securing the technology needed to build a smart factory



Transition from the existing system to a 'digital twin'

Digital twin technology refers to the creation of virtual representations,or models,of real-life products in a virtual space.This technology allows for verification through various simulation tests.The benefits of digital twin implementation have been observed in reducing process loss,shortening labor time,and decreasing defect rates by conducting simulation tests prior to physical production.As a result,digital twins are being increasingly adopted and implemented in the materials and manufacturing sectors,where they provide a competitive edge.Demand for digital twins in the global market is showing high growth as the global manufacturing industry reduces manufacturing costs,improves supply chain operations,and expands adoption of new technologies such as IoT,AI,Big data,Cloud,5G,and VR/AR/MR.According to the Korea Credit Information Services'TDB report(Digital Twin,2021),as of 2020,the market share of the global digital twin by application field was 39.41%for predictive maintenance,26.31%for business optimization,17.51%for performance monitoring,13.41%for inventory management,and 3.2%for product design and development.InGrid Co.,Ltd.,established in 2020,is a company with extensive experience and the necessary technology to build smart factories,including digital twin and metaverse technology.Our range of services includes smart factory consulting and construction,big data analysis,AI model development,3D digital twin implementation,and IoT consulting and development.Notably,our digital twin solutions and services have evolved to a cutting-edge level and are recognized for being among the best in Korea.The history of InGrid's digital twin technology traces back 30 years.Since 1995,we have been involved in interfacing and monitoring facility data for large factories.In 2013,we developed a 3D monitoring system to capture more precise and location-based real-time data.Subsequently,we successfully built a 3D digital twin for POSCO's 2nd hot-rolling facility.Over the years,we have expanded our expertise,constructing digital twin systems for renowned organizations such as POSCO,SK Telecom,Doosan Enerbility,Hanwha Defense,LG Electronics,LIG System,and the Korea Institute of Industrial Technology.

Why digital twins?

The global digital twin market is projected to experience significant growth,with an anticipated increase from $3.15 billion in 2020 to $48.27 billion by 2026,reflecting a compound annual growth rate(CAGR)of 58%.The rapid adoption and distribution of digital twins,particularly in the manufacturing sector,can be attributed to the accelerated development of the manufacturing industry through digital innovation.By capturing and analyzing vast amounts of data throughout the manufacturing process using AI-based solutions,digital twins enable the detection of anomalies and prompt action.Real-time adjustment of supply and demand,identification of equipment defects,and predictive maintenance contribute to streamlining operations and minimizing or preventing downtime caused by breakdowns or failures.These capabilities enhance production and operational efficiency,leading to cost reduction.As a result,the digital twin market is expected to experience substantial growth over the next decade.InGrid has participated in the'5G-based Digital Twin Public Leading'project hosted by the National IT Industry Promotion Agency,an ICT Funding Project,to secure technology suitable for digital twins and manufacturing metaverses that are attracting attention due to future food sources.

Embarking on the digital transformation of the textile industry

The textile industry is in dire need of digitalization,as outdated facilities and data issues with advanced equipment pose significant challenges.Furthermore,the aging process management personnel necessitate the establishment of a data model for process control.InGrid took on the challenge of applying digital twin technology to the textile industry,leveraging our expertise in this area.By developing a digital twin platform specifically tailored for the textile industry,we aim to pave the way for expanding our business into other fields.The implementation of digital twins in the textile industry has proven to be highly successful.Real-time alarm and valve control systems,based on sensor data,have effectively prevented fire incidents and the presence of harmful substances in factories,contributing to enhanced safety measures.The analysis of facility operations,operating ratios,and product output by the production management department has enabled optimal production management,leading to reduced operating costs.Furthermore,precise monitoring of key facility temperatures and humidity levels,as well as comprehensive analysis of production statuses during the pretreatment process,has resulted in reduced rework rates and improved production efficiency.Additionally,the immediate identification of facility failures through spatial information and location-based data,along with temperature measurements of compressors,has significantly enhanced facility maintenance efficiency through the utilization of emergency shutdown prediction services.

Striving for the future of Korea's manufacturing industry

InGrid has developed a digital twin platform applicable to the textile industry to facilitate on-site production operation and inventory management and to manage process and quality information for facility operation in a standardized form,and by linking utility conditions and abnormalities such as automatic temperature and humidity control and fire alarm inside the factory,it has enabled efficient operation through condition analysis using safety management and monitoring.Corporate managers who are new to the effects of these digital twins have also left reviews saying that they were surprised by the more convenient work environment.Ingrid can spread digital twins to domestic and foreign dyeing and processing industries and yarn manufacturing industries at a cost reduced by about 60%,and the expansion through price competitiveness is expected.InGrid is presently in the process of developing an open-source-based domestic manufacturing metaverse platform.This platform will enable factory operations,monitoring,simulations,training,and meetings to take place in a virtual space through the widespread use of digital twins in manufacturing and across various industries.It is expected that Ingrid's desire to make efforts until manufacturing business operators in all fields can obtain higher profits more conveniently and safely through digital twin technology will change the future of Korea's manufacturing industry.

ICT Funding Project

- **Dedicated Institution** National IT Industry Promotion Agency
- **Business Objective** Expansion of intelligent information service
- **Business Description** 5G-based Digital Twin Public Leading(NIPA)

Company information

- **CEO** Yoon Sangwon
- **Type of Business** Application software development
- **Year of Establishment** 2020. 5.
- **Website** www.ingrid.kr

TIME LINE

2020. 5.
Established InGrid Co., Ltd.

2020. 6.
Received an order for a quality linkage system digital twin through analysis of POSCO 2nd hot-rolling facility condition

2020. 8.
Established digital twin for POSCO Chemical

2020. 12.
Won the grand prize for the pre-startup package

2021. 1.
Constructed data analysis, machine learning, digital twin system to improve efficiency of POSCO CSQ combined heat and power generator

2021. 3.
Constructed machine learning and digital twin for prediction of TMS sensor development for Doosan Enerbility's emission reduction

2021. 5.
Establishment of company-affiliated research institute

2021. 7.
Saemangeum Tunnel digital twin-based closed space safety management platform based on Doosan Enerbility Digital Twin

2022. 1.
Established corporate services for the Changwon 3D industrial complex platform construction project

2022. 3.
Developed digital twin for Doosan Enerbility's electric furnace electrode fracture prediction system

Developed digital twin for textile dyeing/processing pilot factory of Korea Institute of Industrial Technology (KITECH)

2022. 10.
Established digital twin at LG Electronics Changwon Plant