



CODEVISION INC.

Research and Development Company
Specializing in Artificial Intelligence

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CODEVISION

Introduction

Intro - Summary



CODEVISION



CODEVISION is an AI-based video solution company established in November 2018.

CODEVISION has deep learning-based data processing, AI development, AI core technology, and can provide operational AI platforms/applications.

We are growing into a technology company that provides the world's best technology in detection, analysis, recognition, tracking, re-recognition, and surveillance.

Company name	CODEVISION Inc.
CEO	Eungyeol Song
Establishment	2018. 11. 10.
Address	[Headquarter] Yonsei University S-Cube 304, 61 Yonsei-ro 2na-gil, Seodaemun-gu, Seoul, Republic of Korea [Branch office] Yonsei University Engineering Research Park 242, 50 Yonsei-ro, Seodaemun-gu, Seoul, Republic of Korea [Gyeongnam office] 16F 29, 33, Pyeongsan-ro, Uichang-gu, Changwon-si, Gyeongsangnam-do, Republic of Korea

Business

Data

AI

Solution

SaaS

2018~2019

- 2018. 06 Order to technological innovation start-up business [Conducted: Small and Medium Business Administration]
- 2018. 11 Established Codevision Inc.
- 2018. 12 Participation in VR/AR infrastructure construction support project (Gyeongnam Techno Park)
- 2019. 04 Selected the core technology development project in Robotics [Conducted: KEIT]
- 2019. 06 Selected early start-up business at Yonsei University [Conducted : Korea Start-up]
- 2019. 08 Design technology development business [Conducted : KEIT]
- 2019. 09 Select a project to support commercialization of VR/AR contents production based on 5G (Ministry of Science and ICT)

2020

- 2020.04 Selected for the AI Voucher Program [Conducted : nipa]
- 2020.05 Selected for the Data Voucher Program [Conducted : Korea Data Agency]
- 2020.08 Delivery of the AI VISION training kit of Changwon University
- 2020. 12 Selected the 2020 Strat-up growth technology development project [Conducted : Ministry of SMEs and Startups]

2021

- 2021.04 Selected for the AI Voucher Program [Conducted : nipa]
- 2021.05 Selected for the Data Voucher Program [Conducted : Korea Data Agency]
- 2021.05 **Venture business approval [Conducted : KOVA]**
- 2021.06 Selected the 2021 ICT R&D Innovation Voucher Program [Conducted : IITP]
- 2021.07 Selected business with shipbuilding and marine industry technology project [Conducted : KEIT]
- 2021.11 **Selected as a superior case in the 2021 AI Voucher Program**
- 2021.12 **Selected as a superior case in the 2021 Data Voucher Program (2 Case)**

2022

- 2022.03 **Selected for the AI Voucher Program [Conducted : nipa] (2 Case)**
- 2022.03 Selected for the Data Voucher Program [Conducted : Korea Data Agency]
- 2022.03 **Selected as a superior case in the 2021 Data Voucher Program**
- 2022.01 Established Affiliated Research Institute(Covi Lab)
- 2022.07 **Approved as a professional R&D institution / engineering R&D institution [Conducted : Korea R&D Industry Association]**

2023

- 2023.01 Selected for the AI Voucher Program [Conducted : nipa]
- 2023.01 Selected for the Data Voucher Program [Conducted : Korea Data Agency]
- 2023.04 IITP selected as a research project specializing in artificial intelligence
- 2023.04 Selected for a startup-centered university take-off project [Conducted : Ministry of SMEs and Startups]
- 2023.04 Selected business with shipbuilding and marine industry technology project [Conducted : KEIT]
- 2023.09 IP Patent R&D Selection

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CODEVISION



Six years of accumulated AI technology



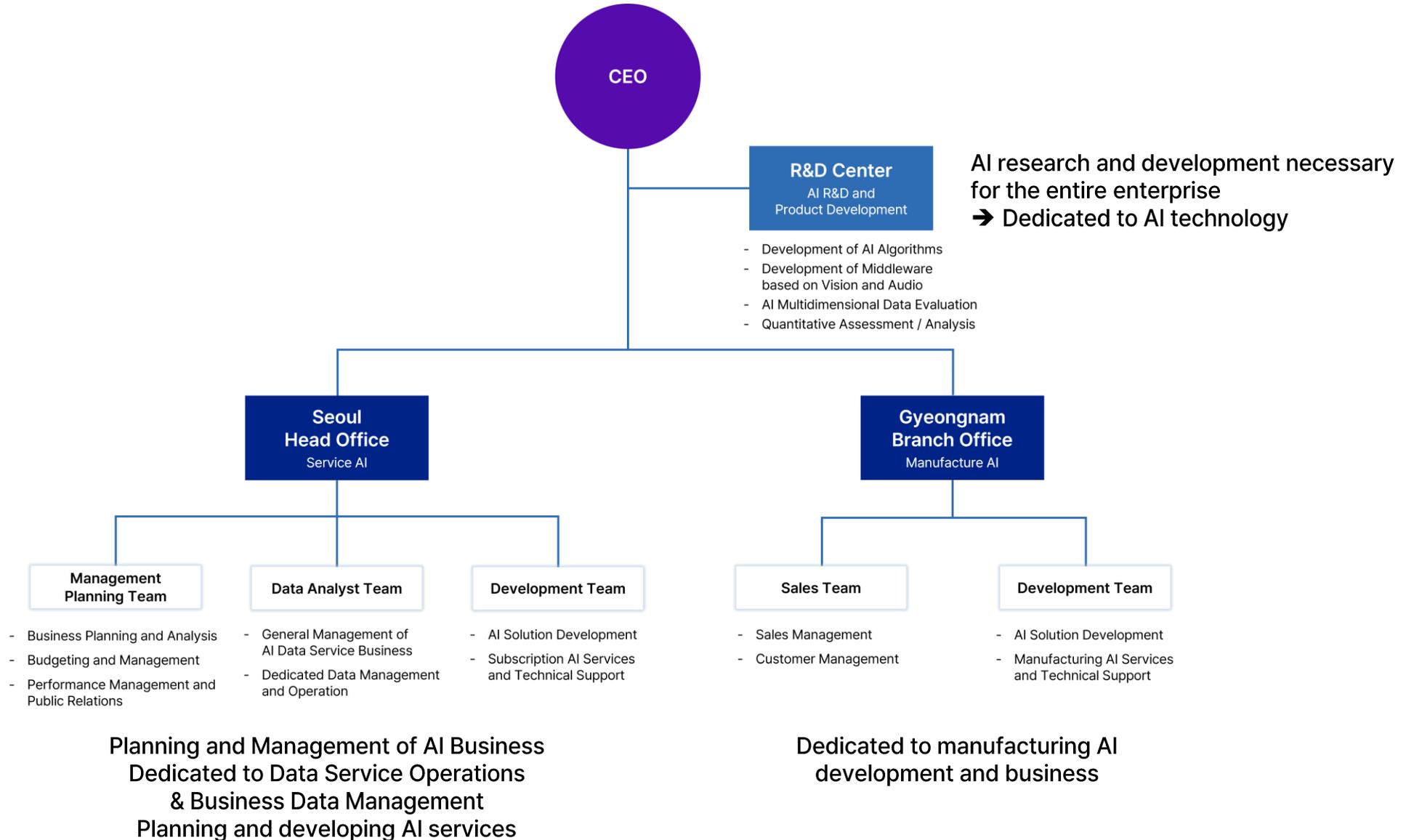
Project success experience with a number of R&D and enterprises



Reliable Field Experience

Facilities, equipment, partner companies ready

Intro - Organization



CODEVISION Solution

2018 ~ 2023 Business Strategy

- Focusing on the development history so far

Build a product portfolio of data processing, system monitoring, and automation solutions centered on artificial intelligence



Data building/labeling/processing business (2019 ~)

- ① Data Voucher Supplier Selection 2021 (Excellent), 2022 (Excellent)
- ② Data processing based on artificial intelligence consulting (entering into various industries such as medical, mobility, smart factories, app services, and diagnostic industries)
- ③ Have labeling tools (cloud type, installation type)

AI detection/recognition middleware solutions (2020 ~)

- ① 30 types of detection/recognition algorithms (as of 2023)
- ② Can be ported to various locations, including Standalone, Cloud, Embedded, Smartphone, On-premise
- ③ Can be built into heterogeneous languages and various systems in API

Learning/Management/Monitoring Platform (2020 ~)

- ① DEVops-Based Traing Platform
- ② Monitoring Platform for Artificial Intelligence Operations
- ③ Management Platform for Data Management

own solution

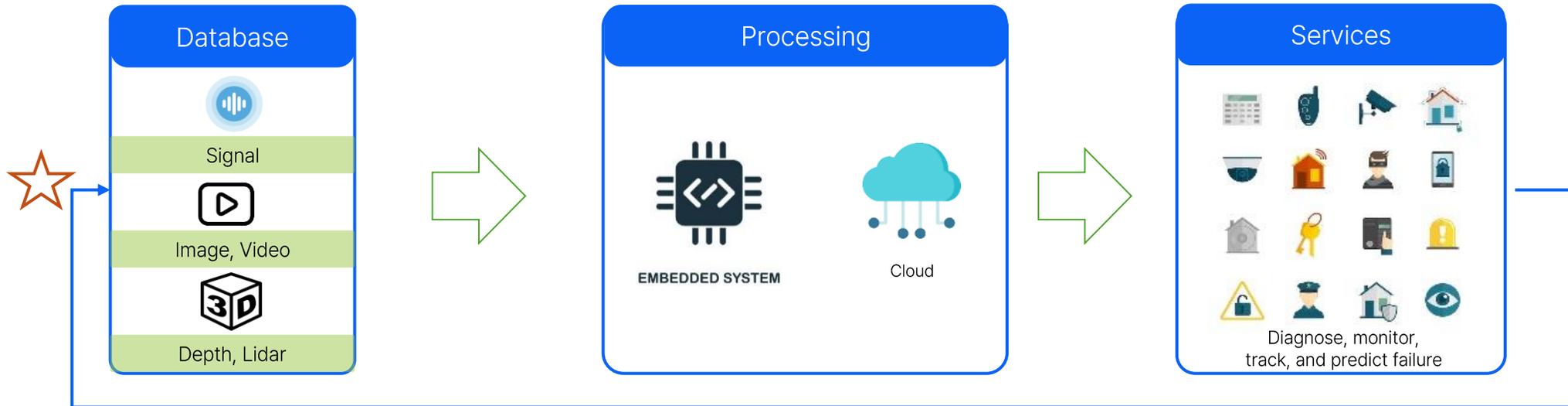
Launched a service for video auto-segmentation (2024 ~) <NEW>

- ① Background Removal Solution Developed as SaaS

Developing a generative AI platform

- ① A platform that returns to video Generative AI technology and data providers

Solution – BUSINESS model

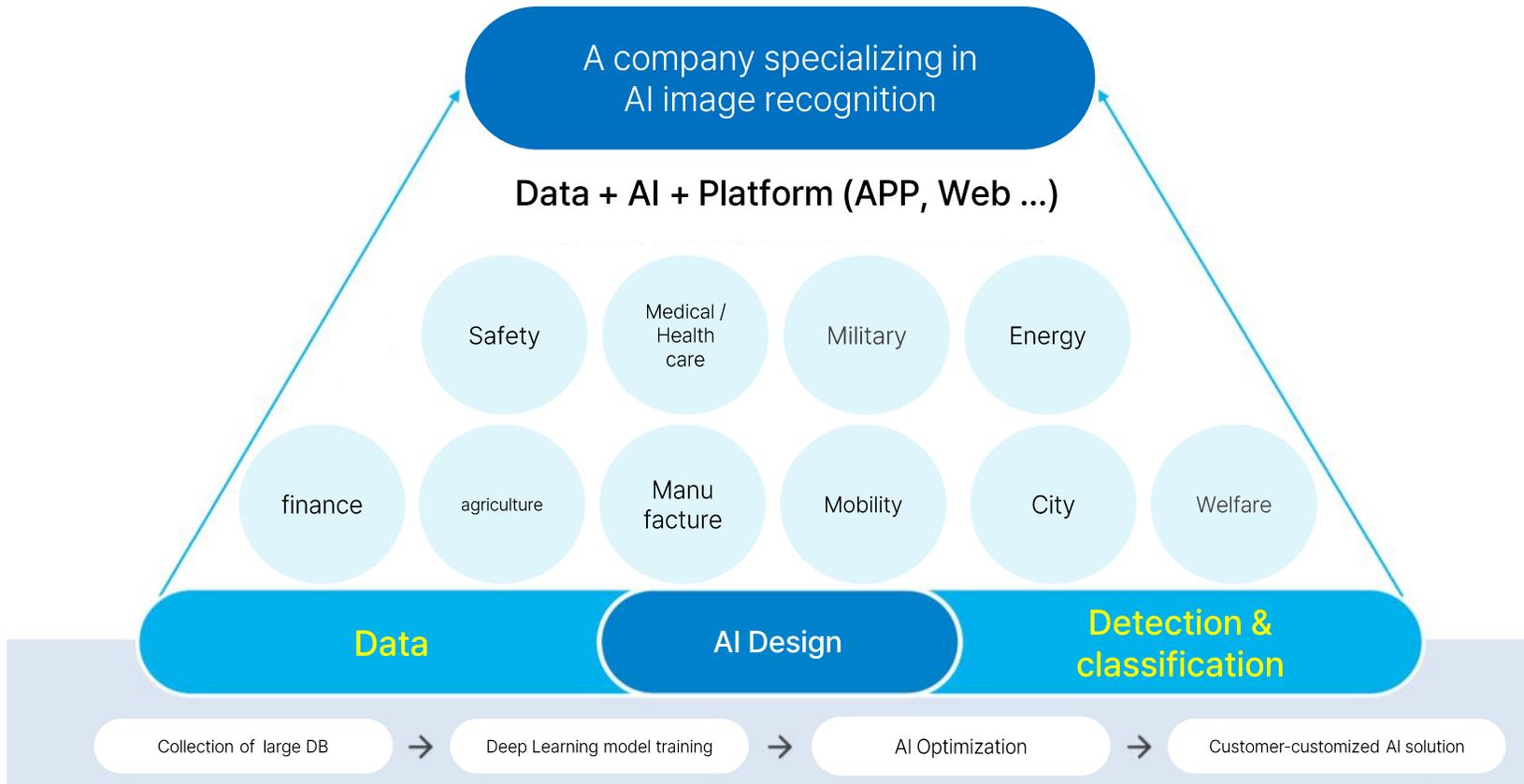


Business Data
Continuous accumulation of data
Data quality management
Reprocessing

Business AI
Accurate Model Needs
Lightweight model (speed, resource efficiency)
Retraining

Additional Analysis
Development of additional models (expanding prediction areas)
New AI Model Change
Redesigning

Solution – BUSINESS model



Data labeling platform
1D labeling (IoT, Ultrasonic waves)
2D labeling (Image, Video)
3D labeling (Depth, Lidar)
N Dimension labeling

AI Core Technologies
Detection
Segmentation
Recognition
Estimation

Operational Solutions (DevOps)
Failure diagnosis
Surveillance
Event Settings
Prediction

Solutions - Project Performance History

AI data Construction / Labeling

- ✓ Golf Behavior and Posture Data
- ✓ Healthcare Exercise Data
- ✓ Indoor environmental human and dog data for autonomous mobility
- ✓ Power Facility Ultrasonic Data
- ✓ Ultrasonic Non-Destructive Data for Industrial Facilities
- ✓ Solar panel defective data
- ✓ 14 types of marine underwater environment data
- ✓ Removing a Person Background
- ✓ Car crash dummy data
- ✓ ...

AI Platform Solution

- ✓ Power Facility Diagnostic History Management Application
- ✓ Fitness Trainer Integrated Application
- ✓ Marine Robot Big Data / Monitoring Platform
- ✓ Future Vehicle Mobility Indoor Environment Analysis Platform
- ✓ PT9 O'clock Fitness Application
- ✓ Video Editing Software-type Background Removal Web Platform
- ✓ Automotive Crash Dummy Data Analysis / Management Solution
- ✓ ...

- ✓ AI-based posture recognition APP [including server]
- ✓ Future Vehicle Mobility Driver/Puppy Detection Module
- ✓ AI power facility abnormality detection module
- ✓ Marine Robot Abnormal Situation Prediction Module
- ✓ Solar panel defect detection module
- ✓ PTZ Camera-Based Pedestrian, Vehicle Detection Deep Learning Middleware
- ✓ Ouster Lidar-Based Pedestrian, Vehicle Detection Middleware
- ✓ High resolution human background removal technology middleware
- ✓ Dummy Data Analysis Middleware Used in Car Crash
- ✓ ...

AI Middleware Development

What is Manufacturing AI

Field-based Manufacturing AI of CODEVISION

What is Manufacturing Data?

01. Manufacturing Data

Digitized data generated by manufacturers in planning, designing, manufacturing (producing) and operating factories

02. Manufacturing Big Data

When manufacturing data grows in size

03. Manufacturing AI Dataset

A collection of structured manufacturing data systematically collected and stored for the purpose of AI analysis

Type of Manufacturing Data

Facility data

Log data for **facility status, control, and connection with external equipment** generated from facilities collected using PLC, etc.

Factory Operations Data

Management data extracted from **manufacturing information systems** (MES, ERP, CRM, SCM, PDM, etc.)

Energy / Environmental Data

Energy (electric, oil, gas) data input to operate plant facilities and equipment

Manufacturing AI - Introducing

- Features of manufacturing data : high diversity, fast production, large size, and highly sensitive



It is important for manufacturers to **discover value** through **clear processing and analysis** for **systematic management and utilization** of large amounts of accumulated manufacturing data

Characteristics	Level	Description
Diversity	High	<p>Various kinds of data generated from the facility during production</p> <p>[Ex]</p> <ul style="list-style-type: none"> • Numerical data from temperature sensor • Image and image data from vision inspection • Vibration and sound data from finished product quality inspection <p>[Reality] Data formats vary due to differences in facility environment by company</p>
rate of production	Fast	<p>When traditional manufacturing is combined with IT technology (sensors), production data information is quickly produced up to seconds and ms</p> <p>[Ex]</p> <ul style="list-style-type: none"> • Numerical data from the temperature sensor (in ms) • mage and image data from vision inspection (in seconds) • Vibration and sound data from finished product quality inspection (in seconds)
Size	Large capacity	<p>Large manufacturing data sets are created that accumulate as data is collected quickly</p> <p>[Ex]</p> <ul style="list-style-type: none"> • (Automobile parts manufacturing industry) When performing quality inspection machine vision: Part manufacturing image data 360TB/ • (Chemical manufacturing) detecting abnormalities in real time, process data collection: 100GB/ day • (Press mold manufacturing industry) Process data collection: 100GB/ day
Sensitivity	High	Manufacturing know-how and trade secrets of each company are gathered

Manufacturing AI - Introducing



- Manufacturing AI : A kind of software that allows you to make your own decisions at a factory that is a manufacturing site

EX. Germany's Industry 4.0 drive - Digital Platforms in Manufacturing Industries report

2. 독일 산학연연구소 동향

① DCC Aachen

DCC Aachen은 독일 서부 도시 아헨(Aachen)에 위치한 디지털 역량센터(Digital Capability Center, DCC)이다. 아헨에는 독일에서 가장 규모가 큰 공과 대학을 중 하나인 아헨공대를 비롯하여 다양한 연구개발 네트워크 및 산학 협력 연구소가 밀집되어 있는데, DCC도 그들 중 하나이며 디지털 제조 및 스마트 팩토리(Smart Factory) 공급망을 위한 플랫폼을 선보인다.

DCC는 아헨공대의 상용기술연구소(ITA RWTH)와 이디다스의 스피드팩토리(Speed Factory) 구축사업에 대한 협력 경험을 바탕으로 2016년 11월 설립되었다. 현재 아헨공대의 상용기술연구소와 컨설팅 업체 IWI인 맥킨지(Mckinsey)가 함께 운영하면서 다양한 협력 솔루션을 통한 기술구현 및 마케팅을 실시하고 있다.

건물 1층 중앙에는 그림 1과 같이 상용실내에서 RFID를 통한 내항량 및 출항량 손색없는 제조 공정을 사례로 하는 스마트팩토리 모델이 마련되어 있으며, 중소기업들을 대상으로 최첨단기술의 디지털화(Digitalization)와 실제 적용을 위한 데모 및 학습공간(모델공장)을 제공한다.



※ 사진 : DCC Aachen

모델공장에서 데모로 보여주는 각 공정은 원자재인 섬유실터에서 발직된 전 실을 옮겨 가는 공정, 섬유를 짜는 방직작업, 열처리, 자체공급 공정, 별도 공점 등으로 구성되어 있다. 각 공정보로 작업자가 착용한 RFID태그, AR안경 등을 통해 정확한 자재공급 및 오류감지로 장비의 정지된 시간을 획기적으로 단축시키거나, 작업자의 숙련도에 따라 발생할 수 있는 오류를 최소화하는 것을 보여준다. DCC를 방문하는 기업과 단체들에게 해당 공정의 데모를 보여주면서 스마트 팩토리 구축에 대한 전반적인 가이드라인을 제공한다. 건물의 4층에는 협력업체들이 상주하면서 스마트 팩토리 연구와 개발에 집중하고 있다.

② 공작기계연구소(WZL)

WZL(Werkzeug Maschinen Labor)은 아헨공대 내에 위치한 산학협력 연구소이다. 정지원으로 로봇암(Robot Arm)을 활용한 다양한 프로젝트를 진행하고 있으며, 승객의 세부분야별로 4종의 책임교수, 8명의 수석연구자, 100-150명의 박사과정 연구원이 연구를 수행한다. 최근 수형 중립 로봇 연구의 주요 세마는 협동로봇(Cooperative Robot, Cobot)을 통해 작업공정을 상호 공유하고 정확한 타이밍으로 협의 작업을 수행하는 것에 초점을 맞추고 있다.

작업지연(Delay)을 줄이는 것이 중요한 산업현장에서 5G 연동형 로봇을 통해 초지연 산업공정을 달성하는 것을 목표로 한다. 또한, 작업자를 보조해주는 AR Glass 연동 로봇, 음성명령을 통해 능동적 동작을 수행하는 로봇, 스마트 팩토리 구축을 위한 background로 데이터를 수집하고 처리하는 Digital Shadow를 지원하는 로봇 연구도 수행 중이다.



※ 사진 : WZL

③ 하노버역량센터

하노버 역량센터는 독일의 북쪽 도시인 하노버에 위치한 중소-중견기업을 지원하기 위해 설립된 기관이다. 독일에서는 특정 중소-중견기업을 지원하기 위한 미테슬란트 4.0(Mittelstand 4.0)이라는 프로그램을 Industry 4.0의 일환으로 진행하고 있다. 이에 따라 각 지역별로 역량센터를 구축하고 스마트팩토리와 디지털화에 대한 실무교육과 참관 및 실험 등을 무상으로 지원하며, 이를 통해 전국에 위치한 기업들의 역량을 강화하는 것이 목표이다. 2016년에 설립을 시작하여 2018년까지 25개의 센터 구축을 완료하였다.

하노버 역량센터는 이들 중 하나로 학습공장(Learning Factory)를 구축하고 공장의 디지털화를 지원한다. 지역 중소기업에게 스마트공장의 구축 방법, 교육, 컨설팅, 네트워킹 등 사업인선에 대한 진행 계획을 지원한다. 사례로 구축한 스마트팩토리는 불만을 제조하는 공정이며, 공장의 단계별로 작업자에게 디지털화된 조립공정의 순서를 알려주고 품질 감사를 수행하는 과정을 보여준다. 이러한 공정 데모는 버스에도 구현하였으며 이동형 학습공장(Mobile Learning Factory)을 지원하고 있다.

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(a) 작업공정 단계별 모델

(b) 실시간 공정현황

(c) 라닝팩토리 내 불만 철삭공정

(d) 이동식 라닝팩토리

※ 사진 : Hannover Mittelstand 4.0

하노버 역량센터는 현재 15명의 상주직원과 25명의 전문가로 구성되어 있고, 총 2,500명의 중소기업 연구원들과 함께 10개 이상의 협력 프로젝트를 진행하고 있다. 예산은 5년간 8백만 달러 수준이다.

④ LN4.0(Lab Network Industry 4.0)

LN4.0은 독일 정부의 Industry 4.0 전략인 'Plattform Industrie 4.0' 정책에서 중소기업을 대상으로 각 분야별로 프로토타입(Prototype)을 구현해볼 수 있도록 지원하는 프로그램이다. 주요 역할은 독일 제조분야 중소기업을 대상으로 신기술 및 혁신 비즈니스 모델을 테스트할 수 있도록 환경을 제공하는 것으로 독일연방경제에너지부(BMWi)에서 지원한다.

Industry 4.0의 선도 기업 및 학 단체들이 연합하여 대학의 연구소를 매칭 또는 관리하고 펀딩한다. 기술표준화, 실험 가능한 Lab의 확보, 사업화 기회 발굴, 기술구현가능성 검증 및 테스트베드 제공, 기업이나 분야중사자 대외의 워크샵 제공 등의 역할도 수행한다.

LN4.0에서는 기존 대학의 연구 인프라를 활용하고 다양한 프로젝트를 통해 Use case를 제공 하는데 대표적으로는 School Cloud, I4.0 사나리우 트레이닝, 5G팩터스 및 테스트베드 제공 등이 있다. 현재 전담직원은 SAP, 아마존AWS 등의 협력 기업에서 파견된 인력으로 구성되어 있다.

- **Purpose of application of manufacturing AI**

- 1. **Technical perspective**

- Equipment anomaly detection:**

- AI diagnoses machines as humans diagnose them so that they can preemptively predict failures and failures
 - Various manufacturing data can be used for AI analysis purposes, including vibration, current, speed, ultrasonic, lubrication, thermal imaging, and electrical analysis from the facility

- Real-time Factory Quality Control:**

- To explore the parameters for optimizing a given objective function in a process using physical models or pre-trained AI machine learning models
 - The more data you accumulate, the more likely you are to explore the optimal process conditions under the given constraints

- Quality anomaly detection/diagnosis:**

- AI analysis of the quality of the product produced with manufacturing data such as images, vibrations, and sounds, and predictions of deviations from the normal range
 - Machine learning methodologies, as well as traditional statistical methodologies, can be used for fault detection with out-of-normal anomaly detection

- Optimizing Long-Term Operations:**

- Monitoring and AI analysis of various equipment used in the process to optimize operations such as increasing operating time, reducing maintenance costs, and minimizing downtime
 - By collecting operational process data, monitoring and AI analysis, it is utilized to analyze whether bottlenecks exist between equipment utilization and to find ways to improve them.

- **Purpose of application of manufacturing AI**

2. Business perspective

Demand forecast and inventory management:

- By predicting the demand for manufactured products, the cost reduction of factory operations is achieved through efficient production and inventory management

Price Optimization:

- Finding the right balance between value and profitability that can have a significant impact on sales, customer satisfaction, income, and achievable growth goals is one of the key determinants for a manufacturer's product competitiveness decisions

Product Development:

- How to apply AI to the product development process (product design, shape development, software testing, etc.) to develop products faster and more effectively

Supply chain optimization:

- Analyzing and coordinating a wide range of information, not only within the enterprise, but also from partners company, raw materials, and consumers

Manufacturing AI Field Application Process

- Building a Manufacturing AI Analysis Model: Identifying Data Collection Items
- Manufacturing data collection: sensor installation at manufacturing site
- Pre-processing manufacturing data
- AI Analysis: Application of AI Model
- Derivation of Analysis Results and Implications: Visualization

CODEVSION

Development Case

Based on the manufacturing AI part

- Detection & Recognition solution
- Proactive Preservation Solution

Detection & Recognition solution



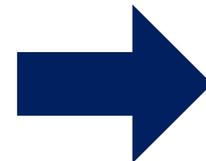
VISION AI Technologies

Introducing AI models in various business fields
and applying detection/recognition technology

Even without existing data, data can be acquired and applied to AI solutions

Easy solution for users through apps or platforms

High reliability with high-quality data by repeatedly inspecting and learning data



Monitoring Abnormalities



Defects Detection



Automation & Assistance

...

Manufacturing AI Detection & Recognition case Ex.

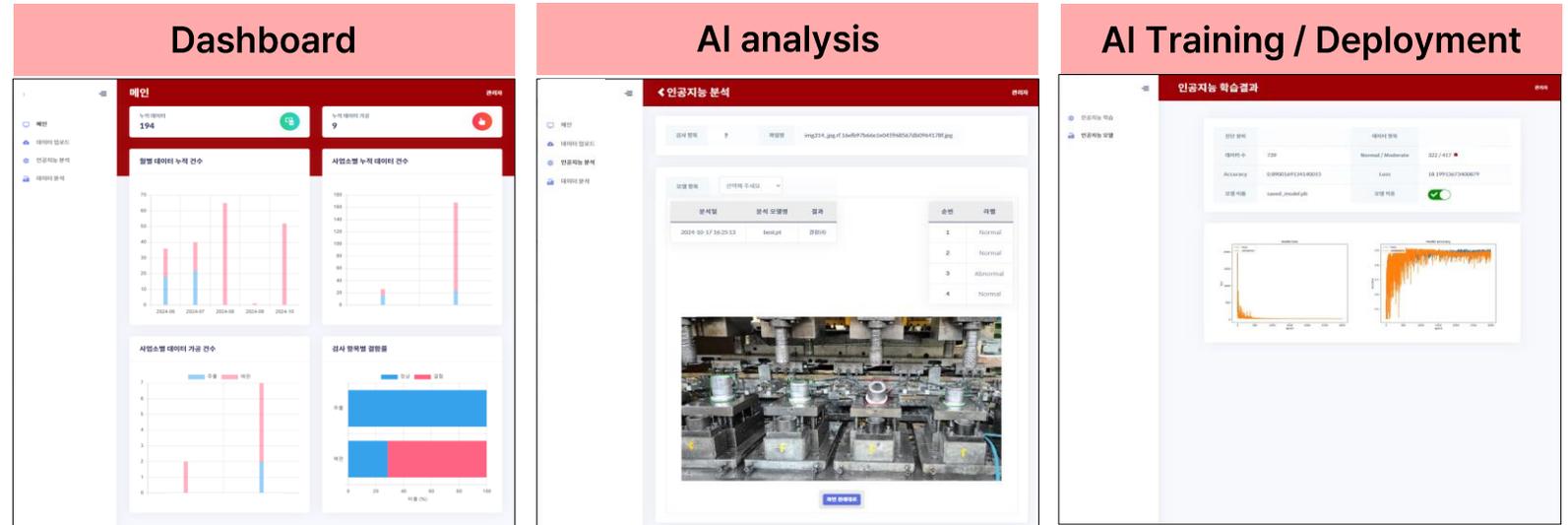
Outer can(Car parts) Detection and Production Defect Monitoring solution

Production site
real-time monitoring platform



- Prevent mold frame damage by predicting defective situations that occur during the molding process in real time
- Provides anomaly detection and notification
 - Maximize factory efficiency and increase productivity by preventing process interruption, mold damage, and defects
 - Enhance worker safety by preventing accidents

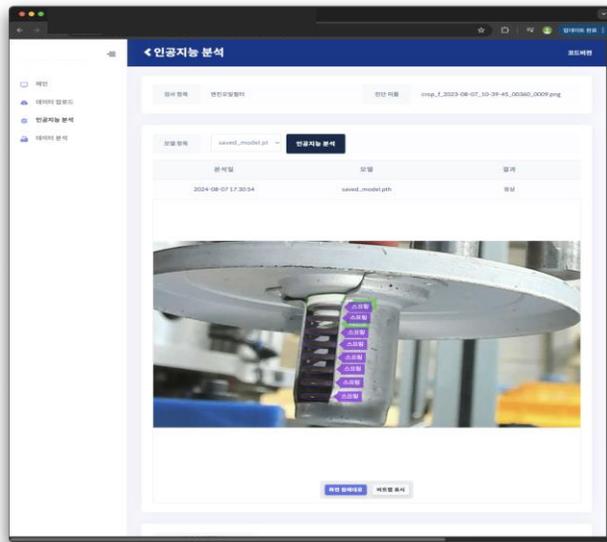
Monitoring MLOps Platform
for Outer Can Formation Step-by-Step



- AI Analysis Platform
- Processing platform for new field data
- Retraining / Deployment Platform

Model enhancement enables continuous high-performance AI service operation

Oil filter Detection and Production Defect Monitoring Solution



- Monitoring Vehicle Engine Oil Filter
Manufacturing Process with Segmentation

- Maximize production efficiency through **automatic inspection system of defective parts**
- Classifiable for defective cases
- Build high-quality datasets for real-world on-site environments



Good

Bed Plate

Bed Spring

AI Tech

Detection

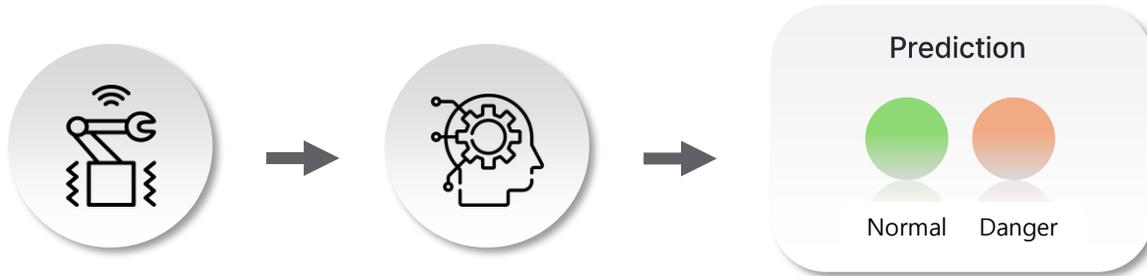
Target

Car parts
(Oil Filter)

Device

Cloud

Predictive Maintenance Solution



Predictive Maintenance

Maintenance method to analyze facility data to proactively identify and act on anomalies

PHM (Prognostics & Health Management)

- A system for performing predictive maintenance
- Predict facility health and help management make decisions based on the results.
- Comprehensive implementation methodology focusing on facility health & remaining life

Use Examples

- Smart Factory
- Manufacturing facility monitoring

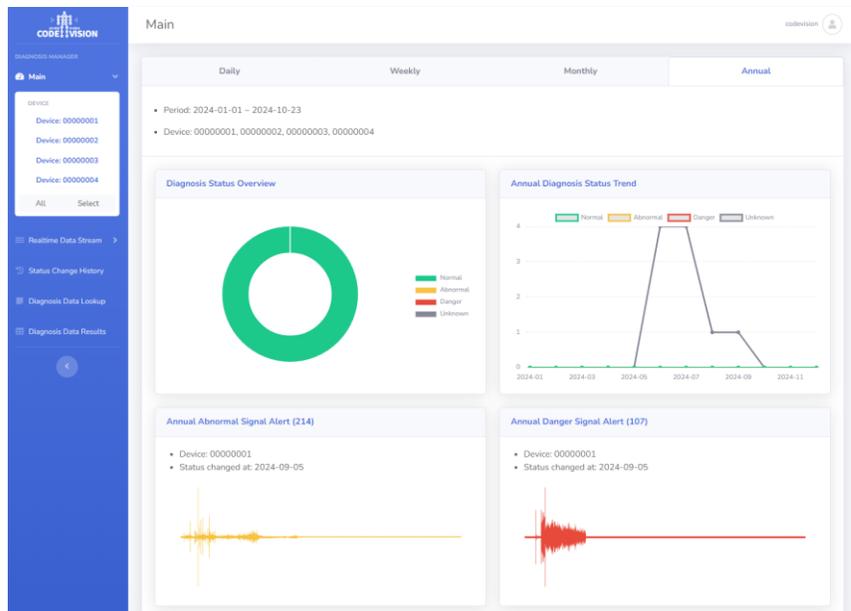
Strength

- Risk prediction by detecting signals such as abnormal vibration or ultrasonic waves
- Reduce facility maintenance costs by predicting failures before they occur



Prognostics and Health Management (PHM) solution

Admin page Dashboard



Automatic data summarization and report generation function



- Monitoring to predict motor operated valve (MOV) failure due to **overstress** and **wear-out**
- Using characteristic **vibration signals** caused by equipment elements defects
- **Systemization of PHM's entire process**
- From sensor installation to platform development
- Send alarms in the event of a failure hazard situation

AI Tech

Prediction

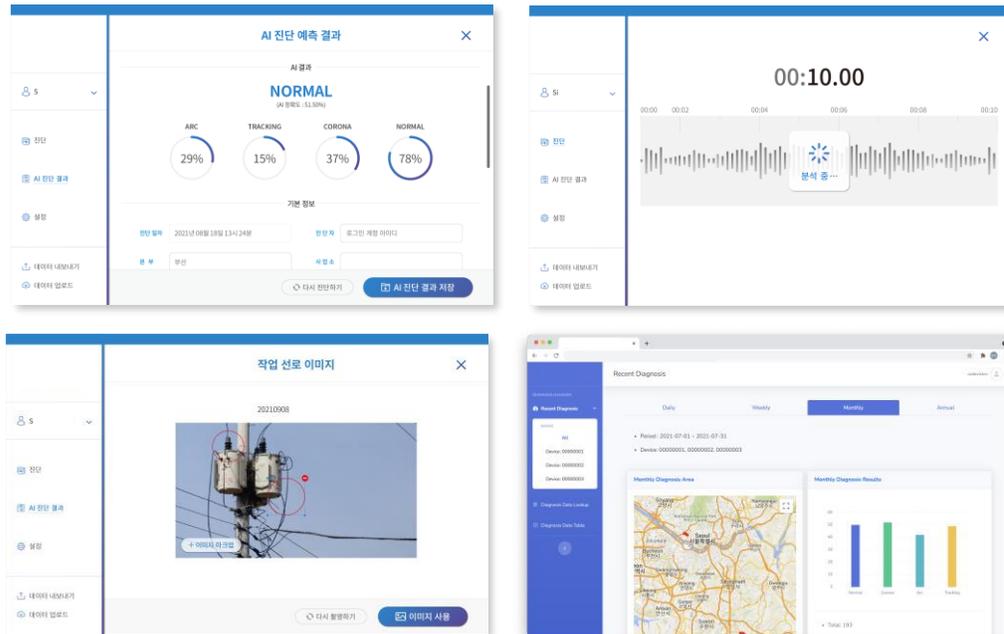
Target

Motor Operated Valve (MOV)

Device

Cloud / On-premise

Electric power equipment failure detection



- Determine the type of failure using the characteristics of accumulated defective **ultrasound data**
 - Mobile Diagnostic App : **Real-time Analysis** of Ultrasonic Data in Site interworking with Diagnostic Equipment
 - Transfer / store / operate data to **the diagnostic history management platform**
- ➔ Automate diagnostic process and database

AI Tech

Prediction

Target

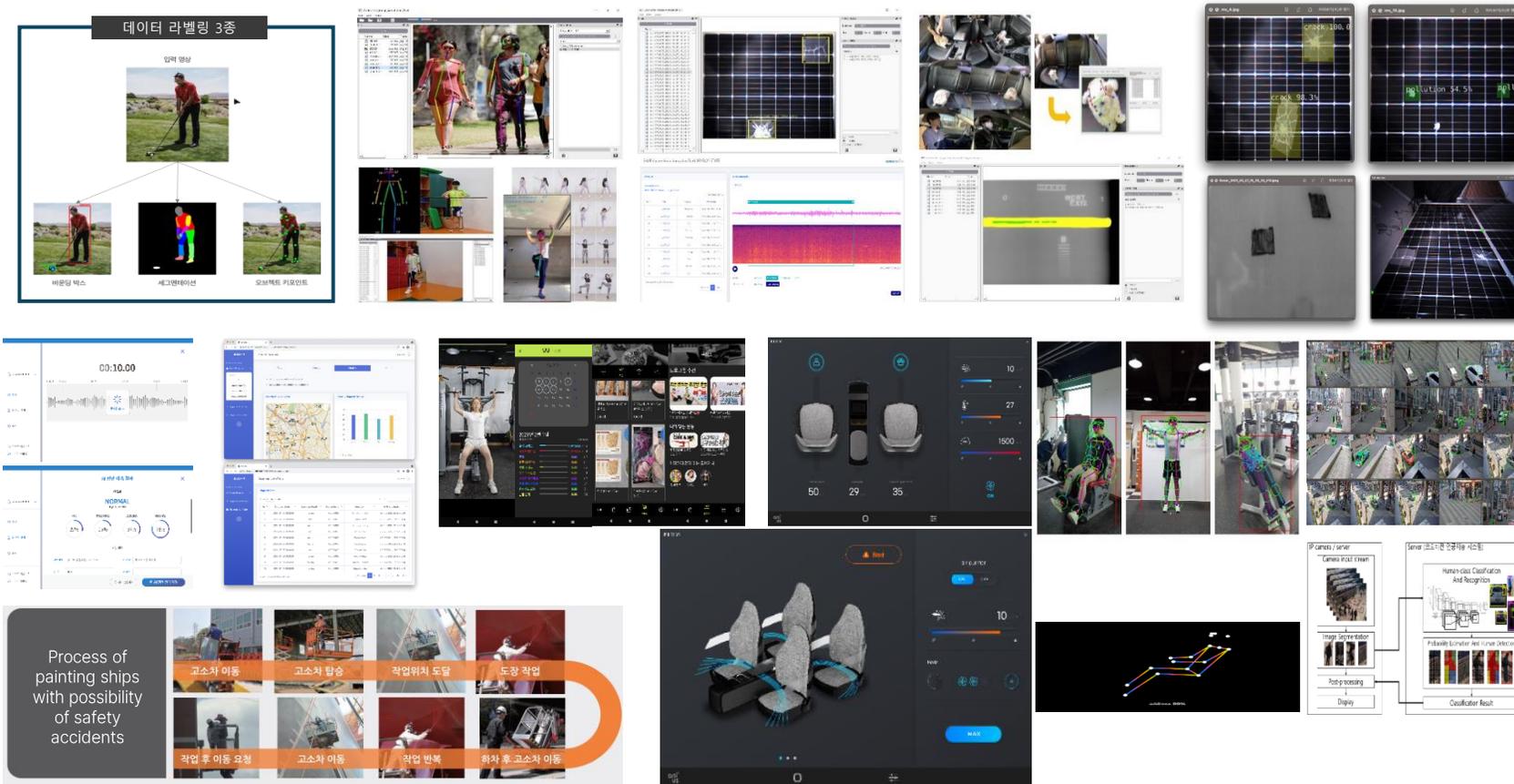
Electric facilities

Device

Cloud /
On-premise

Project Case

In addition, we have demonstrated our capabilities by carrying out many business and projects in various industries such as mobility, environment, and medical / healthcare, etc.



Innovate your industry with CODEVISION !

CONTACT

Homepage : <https://codevision.kr/en>

Email : help@codevision.kr

[Headquarter] Yonsei University S-Cube 304, 61 Yonsei-ro 2na-gil, Seodaemun-gu, Seoul, Republic of Korea

[Branch office] Yonsei University Engineering Research Park 242, 50 Yonsei-ro, Seodaemun-gu, Seoul, Republic of Korea

[Gyeongnam office] 16F 29, 33, Pyeongsan-ro, Uichang-gu, Changwon-si, Gyeongsangnam-do, Republic of Korea