



SMART FARM

RXO Co., Ltd.



Table of Contents

1. Company Introduction
2. Project Introduction
3. Product Introduction
4. RXO AI Software Model

Company Introduction



“
A huge multi-national
corporation deploying
global strategies
RXOWORLD
\$2,941,334,427,450
”

RXOWORLD

PARK SOON JEONG Chairman

Mobile. +82-10-5832-3825
Email. rxoworld0225@rxoworld.com
Fax. +82-62-233-1003
Address. 2 Dosicheomdan 6-ro, Nam-gu, Gwangju, Korea



www.rxoworld.com

RXOWORLD | RXO Co.,Ltd | RXO R&D AI Lab | RXO GROUP Co.,Ltd.
RXO Thailand | RXO Mexico | RXO Phillipine | RXO Serbia | RXO Vietnam | RXO Hong Kong | RXO Indonesia |
RXO America | RXO China | RXO Poland | RXO Dubai | RXO Kazakhstan | RXO Malaysia | RXO Indonesia | RXO
China | RXO Azerbaijan | RXO Brunei

- Company : RXO Co.,Ltd
- Address : 2 Dosicheomdan 6-ro, Nam-gu, Gwangju, Korea
- E-mail : rxoworld0225@rxoworld.com
- Vision : A huge multi-national corporation deploying global strategies RXOWORLD \$2,941, 334,427,450

"RXO, a multinational company
leading global strategies"

About RXO



"Development of next-generation artificial intelligence systems for all electronic products, machinery, and equipment"

RXO Co., Ltd. is an innovative company specializing in AI-based software and specializing in AI-based software and integrated technology solutions, developing AI solutions across a wide range of fields including smart cities, healthcare, retail security, and smart agriculture.

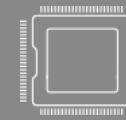
Key products include the AI store management robot **WatchBot**, the medical data optimization solution **HealthSync**, the smart agriculture platform **RXOSF**, and the AI-powered recycling classification system **ReDam**.

RXO participated in CES 2025 and initiated collaboration discussions with **Pfizer**, while also engaging in investment negotiations with **ADQ in Dubai**. In addition, RXO is carrying out AI smart city projects in countries such as **Mexico, Vietnam, and the Philippines**, and is rapidly expanding in the global market.

Through continuous technological innovation and global network expansion, RXO is emerging as a leading company in AI convergence products.



IOT



AI



SMART CITY

"RXO, a multinational company
leading global strategies"

Sales

(1 / 2)

국세청
RIS-00330

발급번호	표준재무제표증명		지리기관
5294-894-3266-817	<input type="checkbox"/> 개인 <input checked="" type="checkbox"/> 법인		국시
상호(법인명)	주식회사 알렉스오그룹(RXO GROUP Co., Ltd.)	사업자등록번호	481-86-01992
성명(대표자)	박순정	주번(법인)등록번호	200111-*****
업종	정보통신업		
종목	인공지능소프트웨어개발프로그램		
사업장	광주광역시 동구 갈남로 238, 16층(갈남로2가)		
사업연도	2023.01.01 - 2023.12.31	발부서류	표준재무상태표 표준손익계산서
신고구분	정기신고	신고일	2024. 03. 29

발행의 표준재무제표는 과세표준 신고시
세무서에 제출한 표준재무제표와 같음을 증명합니다.

2024년 4월 24일

장주세무서장 (인)

접수번호 503914395047

담당부서 민원봉사실

담당자

연락처 062-806-0228

국세청
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* 본 증명은 국세청 홈페이지(www.kosnet.go.kr)의 「인원명령」 서비스에서 「인원명령 원본확인」 버튼을 통해 원세입금으로 위·변조 여부를 확인하거나, 본서 확인의 필요로 확인해 주십시오. 다만, 본세입금으로 통한 확인은 발급일로부터 90일까지 가능합니다. (무문서를 위·변조하거나 명사한 것은 30일 이하의 형사책 처할 수 있습니다.)

* 본 증명은 홈페이지(www.kosnet.go.kr)에서 갱신 유효한 서비스를 통해 발급된 증명서입니다.

(2 / 3)

국세청
RIS-00330

표준재무상태표 (일반법인용)				(단위: 원)			
사업자등록번호	481-86-01992	법인명	주식회사 알렉스오그룹(RXO GROUP Co., Ltd.)	2023년 12월 31일 현재			
법인등록번호	200111-*****						
계정과목	코드	금액	계정과목	코드	금액		
1.총자산	001	18,317,801					
(1)당좌자산	002	18,317,801					
1.현금 및 현금성자산	003	9,317,801					
가.현금	004	10,000,000					
나.기타예수금	005	0					
(2)예외자산	006	0					
(3)기타금융자산	007	0					
다.비율자산	008	0					
(1)부채자산	009	0					
(2)금융자산	010	0					
(3)기타자산	011	0					
(4)기타금융자산	012	0					
비율자산(1+2)	013	18,317,801					
2.총부채	014	1,762,891					
가.부채자산	015	1,762,891					
나.기타예수금	016	0					
다.비율자산	017	0					
비율자산(1+2)	018	1,762,891					
3.자산	019	20,080,000					
가.보통주자본	020	20,080,000					
나.보통주이익	021	0					
다.보통주이익	022	0					
라.기타보통주이익	023	0					
마.기타이익	024	-3,436,090					
바.기타이익(비율자산)	025	-3,436,090					
비율자산(1+2+3)	026	18,884,910					
부채비율	027	18,317,801					

국세청
국세청
국세청

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(3 / 3)

국세청
RIS-00330

2023년 01월 01일 부터	표준손익계산서 (일반법인용)	법인명	주식회사 알렉스오그룹(RXO GROUP Co., Ltd.)		
2023년 12월 31일 까지		사업자등록번호	481-86-01992		
(단위: 원)					
계정과목	코드	금액	계정과목	코드	금액
1.매출액	001	9,090,000			
2.기타매출	002	9,090,000			
가.수입금	003	9,090,000			
나.매출금	004	0			
다.매출금	005	9,090,000			
라.매출금	006	12,500,000			
마.매출금	007	9,355,748			
바.매출금	008	9,355,748			
가.매출금	009	9,355,748			
나.매출금	010	0			
다.매출금	011	0			
라.매출금	012	0			
마.매출금	013	0			
바.매출금	014	0			
가.매출금	015	0			
나.매출금	016	0			
다.매출금	017	0			
라.매출금	018	0			
마.매출금	019	0			
바.매출금	020	0			
가.매출금	021	0			
나.매출금	022	0			
다.매출금	023	0			
라.매출금	024	0			
마.매출금	025	0			
바.매출금	026	0			
가.매출금	027	0			
나.매출금	028	0			
다.매출금	029	0			
라.매출금	030	0			
마.매출금	031	0			
바.매출금	032	0			
가.매출금	033	0			
나.매출금	034	0			
다.매출금	035	0			
라.매출금	036	0			
마.매출금	037	0			
바.매출금	038	0			
가.매출금	039	0			
나.매출금	040	0			
다.매출금	041	0			
라.매출금	042	0			
마.매출금	043	0			
바.매출금	044	0			
가.매출금	045	0			
나.매출금	046	0			
다.매출금	047	0			
라.매출금	048	0			
마.매출금	049	0			
바.매출금	050	0			
가.매출금	051	0			
나.매출금	052	0			
다.매출금	053	0			
라.매출금	054	0			
마.매출금	055	0			
바.매출금	056	0			
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나.매출금	058	0			
다.매출금	059	0			
라.매출금	060	0			
마.매출금	061	0			
바.매출금	062	0			
가.매출금	063	0			
나.매출금	064	0			
다.매출금	065	0			
라.매출금	066	0			
마.매출금	067	0			
바.매출금	068	0			
가.매출금	069	0			
나.매출금	070	0			
다.매출금	071	0			
라.매출금	072	0			
마.매출금	073	0			
바.매출금	074	0			
가.매출금	075	0			
나.매출금	076	0			
다.매출금	077	0			
라.매출금	078	0			
마.매출금	079	0			
바.매출금	080	0			
가.매출금	081	0			
나.매출금	082	0			
다.매출금	083	0			
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마.매출금	085	0			
바.매출금	086	0			
가.매출금	087	0			
나.매출금	088	0			
다.매출금	089	0			
라.매출금	090	0			
마.매출금	091	0			
바.매출금	092	0			
가.매출금	093	0			
나.매출금	094	0			
다.매출금	095	0			
라.매출금	096	0			
마.매출금	097	0			
바.매출금	098	0			
가.매출금	099	0			
나.매출금	100	0			

국세청
국세청
국세청

매출관련 키워드
수치에 대한 간단한 설명을 써주세요

* 본 증명은 국세청 홈페이지(www.kosnet.go.kr)의 「인원명령」 서비스에서 「인원명령 원본확인」 버튼을 통해 원세입금으로 위·변조 여부를 확인하거나, 본서 확인의 필요로 확인해 주십시오. 다만, 본세입금으로 통한 확인은 발급일로부터 90일까지 가능합니다. (무문서를 위·변조하거나 명사한 것은 30일 이하의 형사책 처할 수 있습니다.)

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"RXO, a multinational company
leading global strategies"

Credit

01. 기업개요

WWW.IJREPORT.COM

(주)발엑스오 | 631-81-02970

신원조사 대상업체	
기업명	(주)일렉트로
기업형태	법인 / 총8기업
사업자등록	631-81-02979
설립일자	2022.11.02
대표자	윤남기(나트)
평균신원점수	(A)3099
	그 외 기타 정보 서비스업
종업원수	-
주소	영1482)
	영구 영구 공보로 238; 16층 (공보로2가,달계소문 소문로4동)
전화	-
홈페이지	-

※ '보통물류업종'에 속하는 기업정보를 바탕으로 제정규형에 의해 자동 산출된 물량으로, 수입된 정보에 따라 변경될 수 있습니다.

■ **산학협력 강화** ■ **연구개발 강화**

■ 산업 내 위치

■ 기업평가등급 이해



■ 기업신용정보 요약현황

구분	의해제 전기연계	신용도합산	공공정보	신용도합산(신정)	연속거래장시/무도	법정관리/확의
전수	0	0	0	0		
충당액	0	0	0	0		

※ 신동우관(신동우) 항목에는 금융기관에서 발생한 연체, 신동우관(신영) 항목에는 기업 간 상거래에서 발생한 채무불이행의 건수 및 금액이 표시됩니다.

NICE 평가정보

3

02. 주요재무현황

WWW.KISREPORT.COM

(주)알렉스오 | 631-81-02970

주요 재무사항							(단위: 백만원)
결산연월	자산총계	무채총계	자본총계	매출액	영업이익	순이익	
2023.12.31	240	141	107	201	16	7	
당사자전	-	결산 12/월	-	회계감사법인	-	-	

■ 재무비율분석

	항목	2023. 12. 31			
		대상기업	환원평균	대상기업	환원평균
성장성	매출성장률	%	--	--	--
	총자산성장률	%	--	--	--
	영업이익성장률	%	--	--	--
수익성	총자산이익률	%	--	--	2.98
	자기자본이익률	%	--	--	6.91
	매출이익이익률	%	--	--	3.70
	자기자본이익률	%	--	--	43.16
안정성	부채비율	%	--	--	131.67
	차입금의존도	%	--	--	66.71
활동성	총자산회전율	회	--	--	0.81
	매출회전율	회	--	--	--
	자기자본회전율	회	--	--	--

※ 한은통계포털 한국은행에서 매년 발표하는 업종별 통계 수치값입니다.

■ 주요비용 시계열분석

Figure 1 consists of four bar charts comparing the first and second waves of the COVID-19 pandemic in South Korea. The top row shows the total number of cases and deaths, while the bottom row shows the daily change rate of cases and deaths. The y-axis for the top row is '인원수' (Number of cases/deaths) and the y-axis for the bottom row is '일일증감률' (Daily change rate). The x-axis for all charts is '연월' (Year-Month).

인원수	사망수	일일증감률	일일사망률
1st wave	1st wave	1st wave	1st wave
2nd wave	2nd wave	2nd wave	2nd wave

NICE 정보

4

03. 소속산업 분석

WWW.EJREPORT.COM

(주)알렉스오 | 631-81-02970

■ 산업개요		■ 산업설명	
산업명	그 외 기타 정보 서비스업	주요종목	3차 기타 정보 서비스업
산업코드	859999	산업명	지정하는 3차 기타 서비스업에 해당한다
주요 기업 4(만원)	2,580 자	(단위)	
주요 기업 4(만원)	33 자	핵심 기업명 4(만원)	
		(단위)	

■ 주변지역 동종업체 (그 외 기타 정보 서비스업)

구분	기입방법	해설	분석주요점
A	일반 (00)일반소득	일반법인세	종가 총무 공제율 23%, 10종 (공제율 27%, 일반소득종사 무형자산)
B	-	-	-
C	-	-	-
D	-	-	-
E	-	-	-
F	-	-	-
G	-	-	-
H	-	-	-

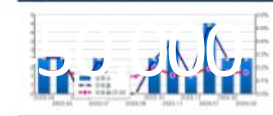
■ 산업재무 분석(전국 기준)

건별명	2020	2021	2022	비고	2020	2021	비고
지선동복	1,474,432	3,372,496	2,817,279	충청남도지하철	12.03	32.48	9.1
사동복	1,142,264	1,787,143	1,948,348	충청남도지하철	10.02	26.88	7.9
태백동	1,508,022	1,678,884	1,474,903	부천지하철	26.04	32.17	34.2
영일지하	533,027	527,621	129,888	충청북도	28.13	190.52	182.4
	124,888	810,268	195,581	충청북도지하	13.29	47.03	-12.6

■ 부도를 추이 분석



■ 금융기관 연계를 추이 분석



NICE 指南与循证 4

5

| Project Introduction



It is a smart farming solution that enables integrated control and real-time monitoring of Bluetooth-enabled IoT devices. It is a comprehensive agricultural management platform equipped with environmental data collection, cultivation management functions, crop protection features, and safety management capabilities.

Main Features



Cultivation Management Function

- Seeding and Transplanting Timing Prediction
- Seeding and Transplanting Automation System
- Nutrient and Water Management
- Temperature, Humidity, and Light Intensity Control
- Growth Condition Monitoring
- Fruit Harvest Timing Prediction



Crop Protection Function

- Climate Anomaly Detection
- Fire and Wildlife Detection
- Crop Disease Detection



Safety Management Function

- Safety Management Function

Mobile Farm



It is a portable farm management device that can be installed in various locations across large farms, supporting farm management in diverse agricultural environments such as greenhouses and open fields. Additionally, the device allows for real-time status monitoring and easy operation through a web or app.

It includes an efficient farm management computer system, enabling farm information integration and an AI-based farm management system to be used in agricultural environments.



01

Cultivation Management Function



Seeding and Transplanting Timing Prediction

By utilizing sensors to collect real-time data such as soil moisture, temperature, and light intensity, as well as analyzing historical input data, it determines the optimal seeding and transplanting times. It comprehensively considers climate change and soil environment variables, automatically adjusting the seeding schedule for each crop and creating optimal growing conditions from the earliest stages of cultivation.

Seeding and Transplanting Automation System

At the predicted optimal seeding time, an automatic seeding device is used to place seeds at uniform intervals, while adjusting the soil moisture and nutrient levels in real time to increase the initial germination rate. During the transplanting process, the growth status is analyzed to transplant crops at the appropriate time using an automatic transplanter, creating an environment that aids root establishment and promotes healthy growth.





Nutrient and Water Management

Through an automatic irrigation system and soil analysis, the water requirements of the crops are precisely adjusted, and nutrient supply is optimized to support healthy growth. The system analyzes the crop's nutrient requirements and delivers customized fertilizers accordingly.

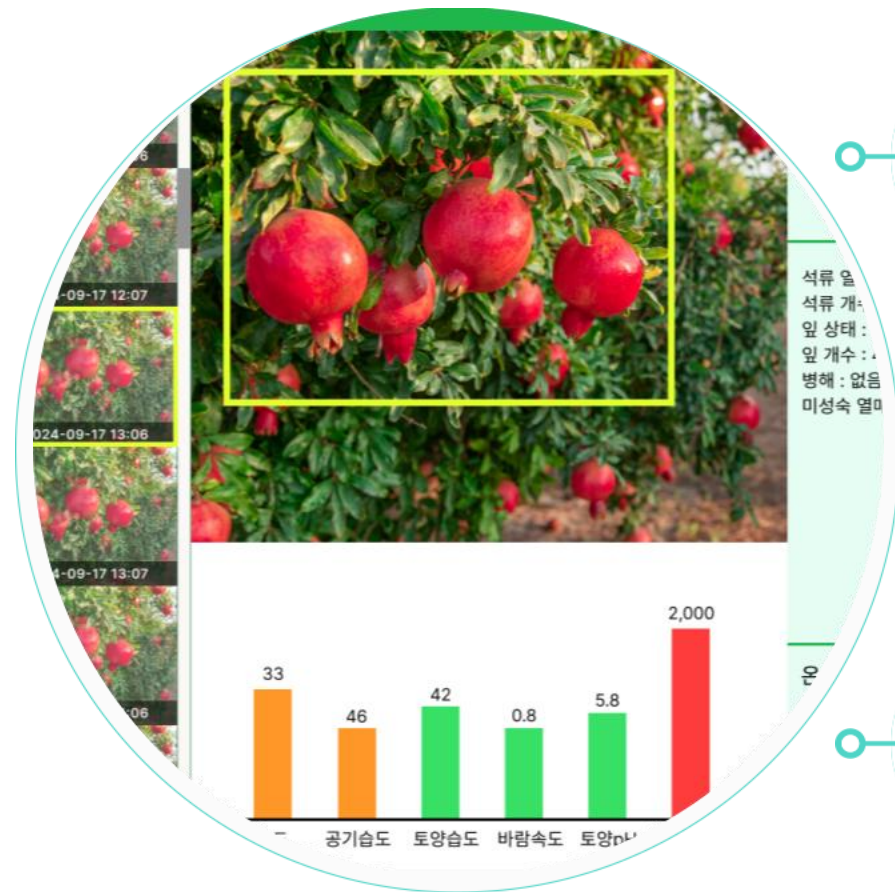
Temperature, Humidity, and Light Intensity Control

Using a smart greenhouse and shading system, temperature and humidity are adjusted in real time, and optimal light intensity is provided according to the season and weather, maintaining the environment necessary for crop growth.



SMART FARM

A DEVICE THAT UTILIZES AI TRAINED ON V100 WITH MODELS LIKE PYTORCH, TENSOR FLOW, RESNET, CNN, AND EFFICIENTB0 TO DIAGNOSE THE QUALITY CONDITION OF POMEGRANATES AND MANAGE THE FIELD ENVIRONMENT OF POMEGRANATES.



DIAGNOSTIC PROGRAM

DIAGNOSTIC PROGRAM

WE ASSIST IN FARM MANAGEMENT THROUGH A POMEGRANATE DISEASE DIAGNOSIS PROGRAM UTILIZING PYTORCH AND THE CLIP MODEL.

DISPLAY FARM ENVIRONMENTAL DATA

REPORT

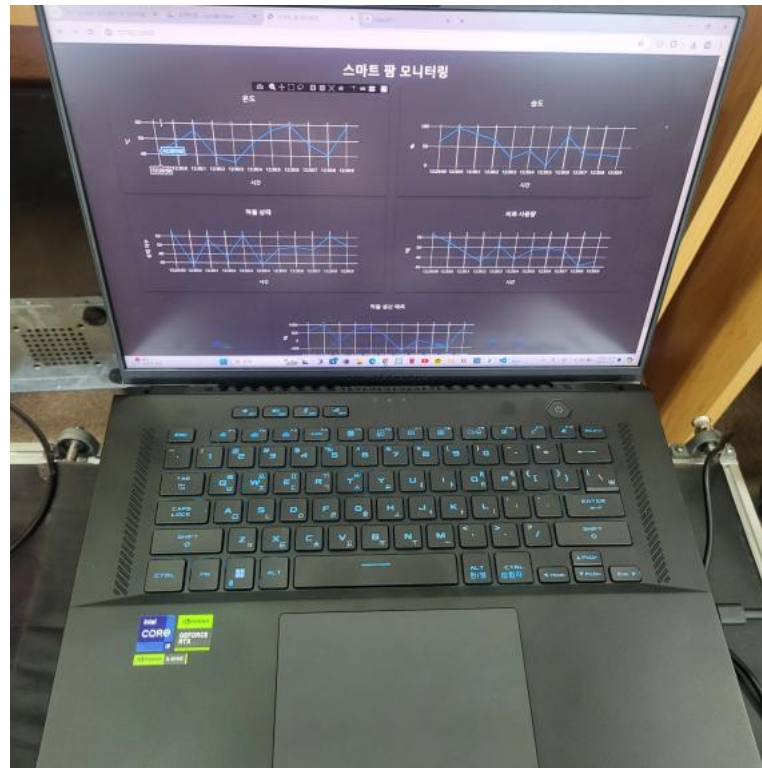
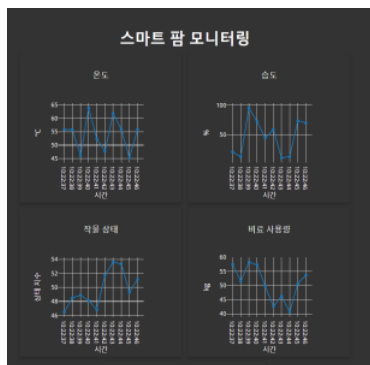
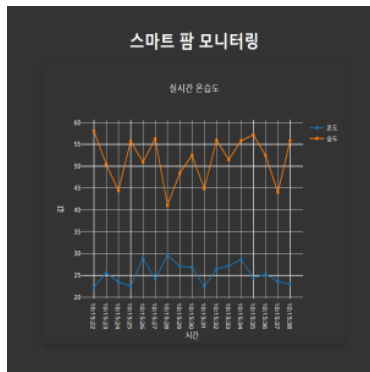
FUNCTION THAT DISPLAYS VALUES OBTAINED THROUGH SENSORS AND AI MODEL ANALYSIS RESULTS

SMART FARM ENVIRONMENT MANAGEMENT

KEY POINT

WE HELP MAINTAIN A WELL-MANAGED FARM ENVIRONMENT BASED ON THE AI ANALYSIS REPORT.

Real-time monitoring



Temperature and Humidity Monitoring

Crop Growth Optimization: Maintaining optimal temperature and humidity levels is crucial to maximizing crop health and yield.

By maintaining appropriate temperature and humidity levels, crop health can be optimized and yields can be maximized.

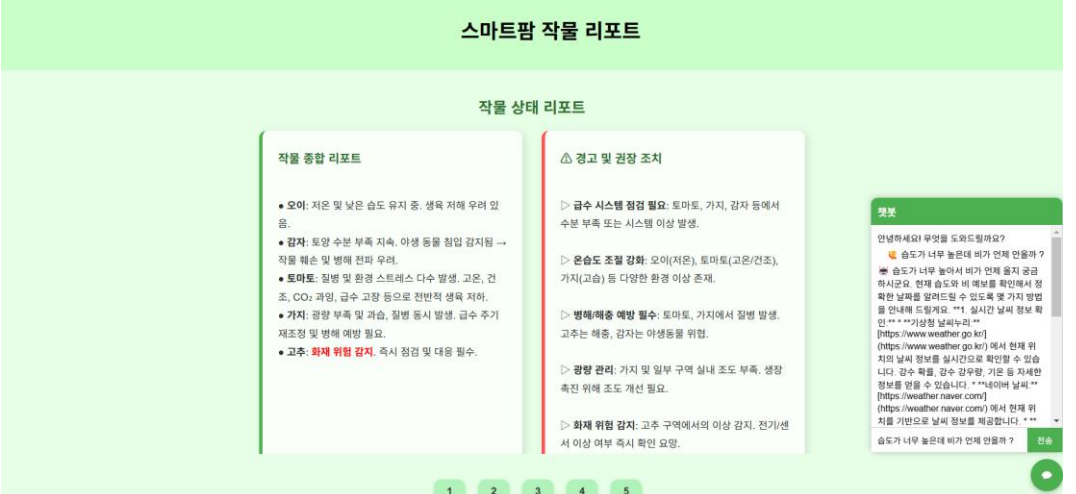
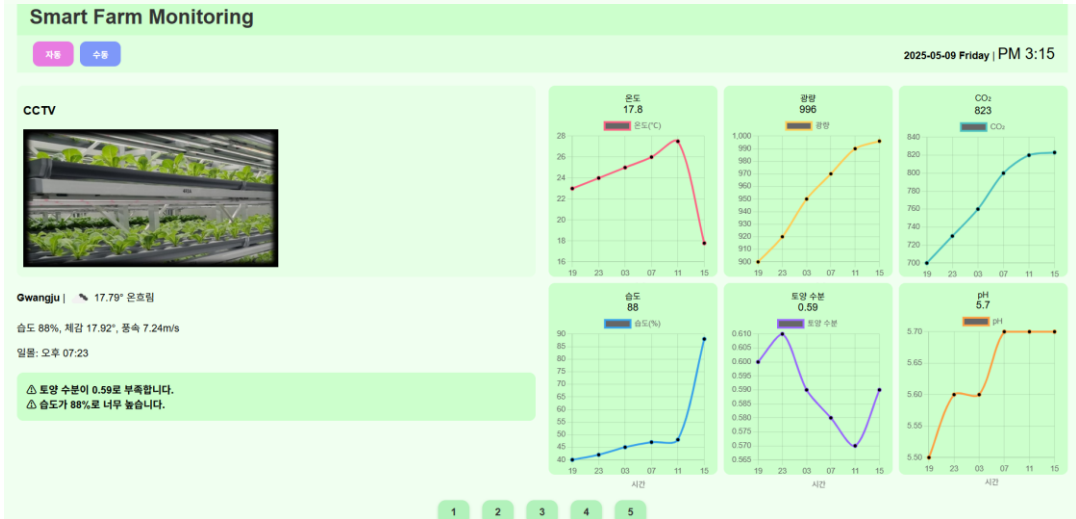
Resource Conservation: Energy and water usage can be optimized by adjusting heating, cooling, and irrigation systems according to environmental conditions. This contributes to cost savings and resource conservation.

Plant Growth and Disease Analysis

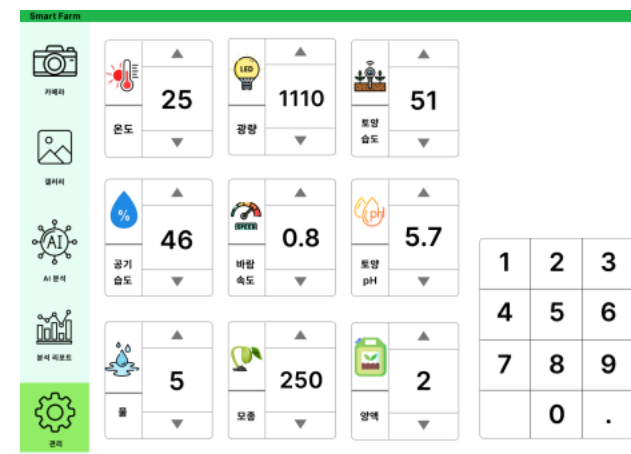
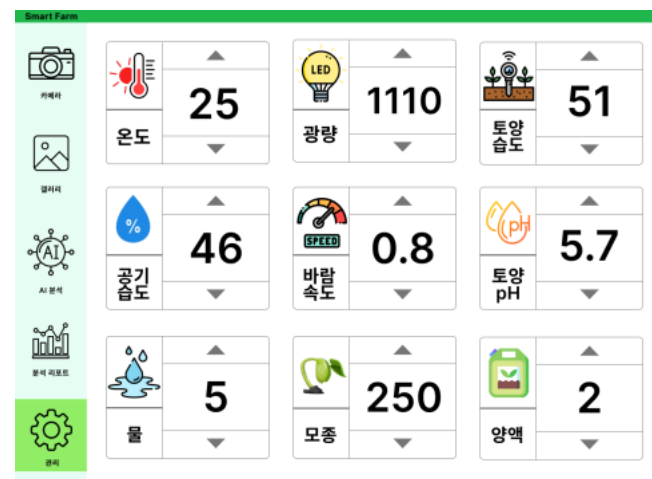
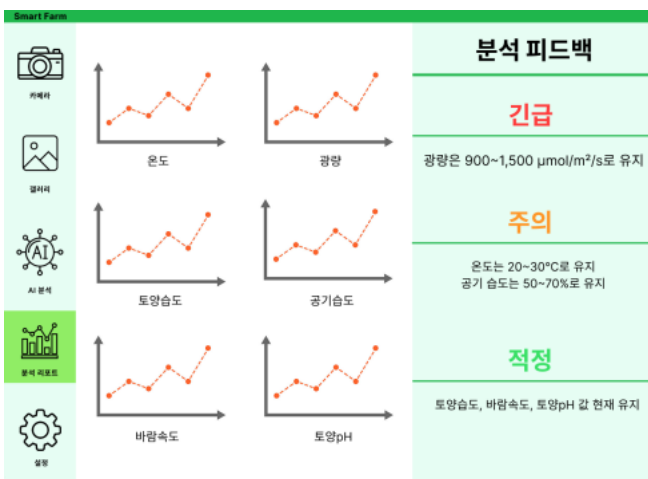
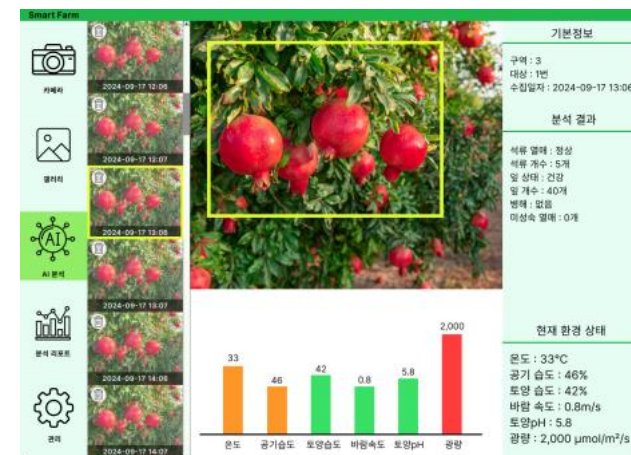
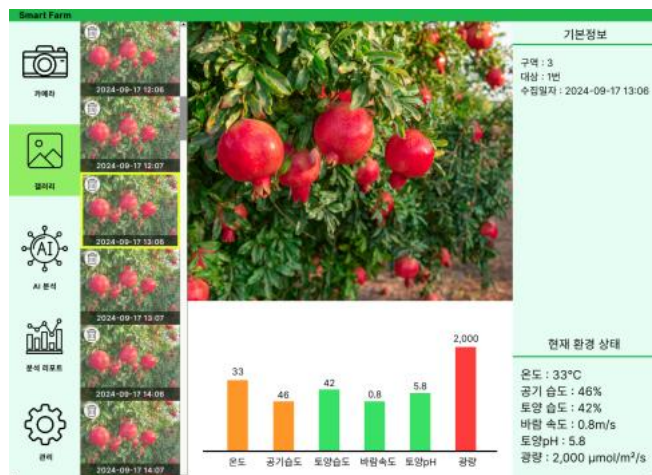
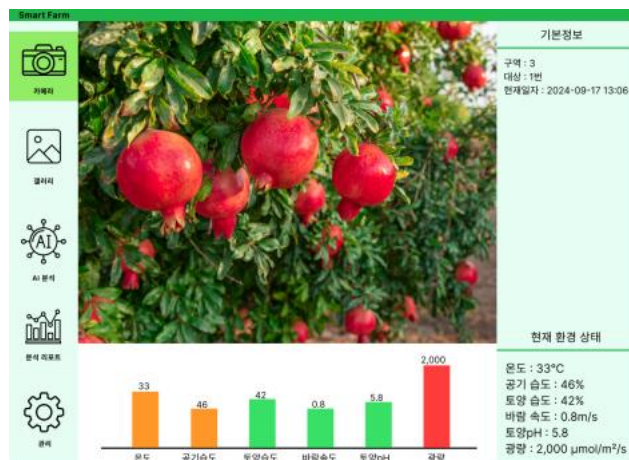
Using image and video data of plants, it displays the percentage according to the growth level of the plant, informs the expected harvest time, and

if a disease occurs, it informs the disease that has occurred through the data learned by AI analysis.

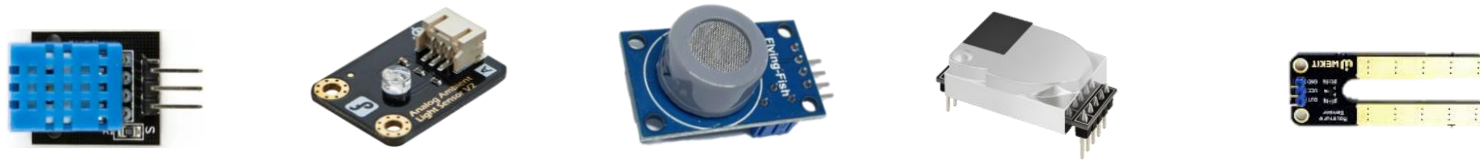
PRODUCT



PRODUCT(Mobile)



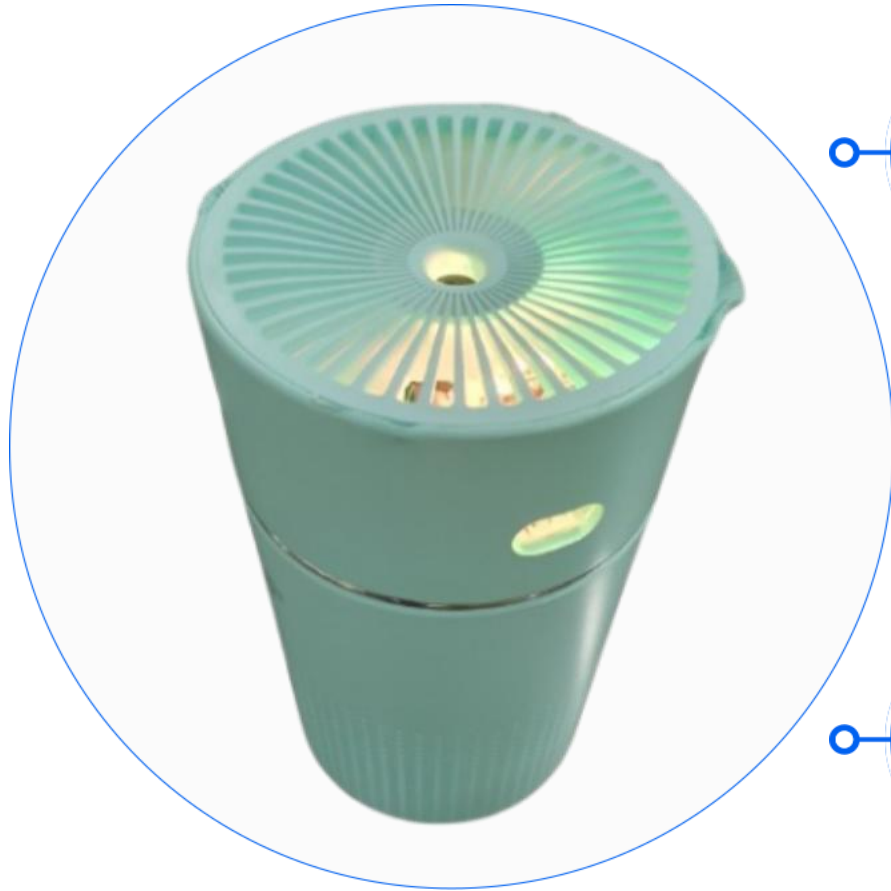
Specifications of SmartFarm environmental data collection device



측정값	센서 이름	센서 측정 범위
온도 · 습도	DHT11	온도 : 0℃~50℃ 습도 : 20%~95%
조도	DFR0026	1lux~6000 lux
CO	MQ-7	200~2000ppm
CO2	CM1106(Single)	0~5000ppm
토양 수분	SEN0114	0~950

환경이

INDOOR ENVIRONMENTAL DATA COLLECTION DEVICE USING IOT SENSORS



TEMPERATURE AND HUMIDITY SENSOR | KEY POINT

THE ENVIRONMENT DETECTS AND MEASURES THE SURROUNDING TEMPERATURE AND HUMIDITY.



AIR DETECTION SENSOR | KEY POINT

DETECTS AIR QUALITY AROUND THE ENVIRONMENT, SUCH AS CARBON DIOXIDE AND CARBON MONOXIDE, USING VARIOUS SENSORS

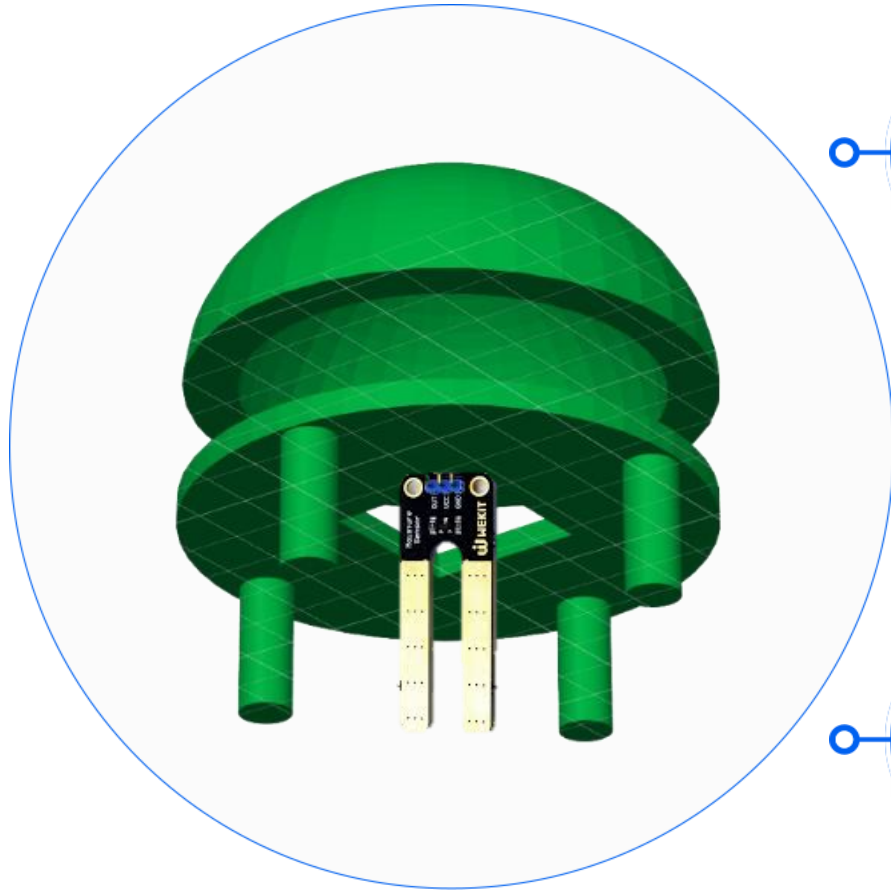


BLUETOOTH CONNECTION | KEY POINT

Check smart farm environment data values using Bluetooth connection

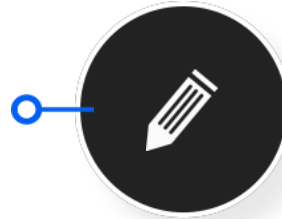
soil environment

Soil moisture data collection device using IoT sensors



soil moisture sensor

Detects moisture levels in the soil.



low power consumption

Low power consumption as it uses batteries.



bluetooth connection

Check smart farm environment data values using Bluetooth connection

SMART FARM MANAGEMENT

Farm Environment Management Based on Analysis Report



ENVIRONMENT MANAGEMENT | KEY POINT

WE MANAGE VARIOUS ENVIRONMENTAL FACTOR VALUES BASED ON THE ANALYSIS REPORT.



SMART FARM CULTIVATION MANAGEMENT | KEY POINT

WE PROVIDE WATER AND NUTRIENT SOLUTIONS AND PLANT SEEDLINGS TO CREATE THE OPTIMAL GROWTH ENVIRONMENT.

INTRODUCTION

"SMART FARM MANAGEMENT"

Smart farm environment and cultivation management system

Smart Farm Management Integrated System

A system that manages environmental factors such as humidity,

temperature, light intensity, and soil pH of the farm, automatically waters and provides nutrients based on set values,

and plants seedlings in the specified quantity.

The system supports separate displays for the monitor and laptop, with the laptop enabling numeric input functionality.

The laptop screen should allow numeric input.



카메라



갤러리



AI 분석



분석 리포트



관리



카메라



갤러리



AI 분석



분석 리포트



▲

25

▼

온도

▲

1110

▼

광량

▲

51

▼

토양 습도

▲

46

▼

공기 습도

▲

0.8

▼

바람 속도

▲

5.7

▼

토양 pH

▲

5

▼

물

▲

250

▼

모종

▲

2

▼

양액

▲

25

▼

온도

▲

1110

▼

광량

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51

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토양 습도

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공기 습도

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바람 속도

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5.7

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토양 pH

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5

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물

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250

▼

모종

▲

2

▼


양액

1	2	3
4	5	6
7	8	9
	0	.

CCTV



★ 남구 대촌동 🕒

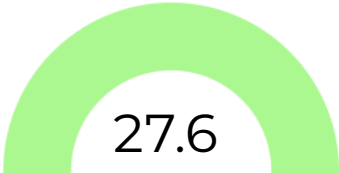
 21° 맑음

습도 29% · 체감 20° · 남동풍 2.5m/s
미세 나뭇잎 초미세 보통 일몰 18:48

Warning Messages

The temperature is high. Please maintain an appropriate temperature.
Soil moisture is insufficient. Please provide adequate water.

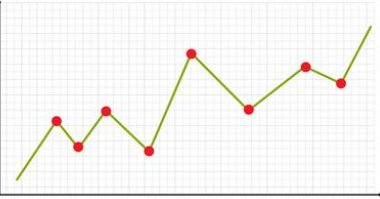
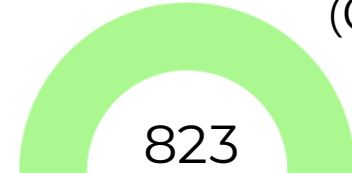
Temperature



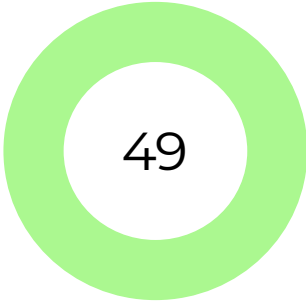
Light Intensity



Air Concentration
(CO₂)



Humidity



Soil Moisture



Soil pH



Safety Management



The farmer is currently located in Farm 1.

Fire Detection



Emergency Situation!
Fire detected in Farm 5.

119

Crop Disease Detection



Currently, disease has been

Heater

X

Set Temperature


22

123

456

789

*0#



Environmental Data Control

Target	Current
Temperature : 22	Temperature : 27
Light Intensity : 1350	Light Intensity : 1700
CO ₂ : 560	CO ₂ : 950
Humidity : 64	Humidity : 25
Soil Moisture : 0.59	Soil Moisture : 0.12
Soil pH : 6.2	Soil pH : 5.8
Heater	Humidifier
LED Light	Water Supply
CO ₂ Generator	pH Regulator



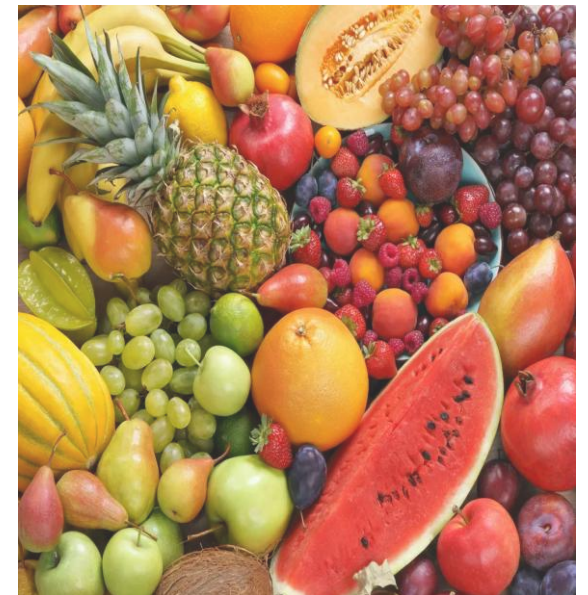
Growth Condition Monitoring

Real-time sensors collect data on temperature, humidity, soil moisture, light intensity, and more, while AI-based analysis is used to precisely monitor the growth condition of the crops.

Accuracy of 95% or higher

Fruit Harvest Timing Prediction

By comparing and analyzing real-time data collected by sensors (such as temperature, humidity, air concentration, etc.) with various historical environmental data, the growth condition of the crops is precisely evaluated. It also comprehensively considers factors such as temperature, humidity, and soil conditions to predict the optimal harvest timing —achieving an accuracy rate of over 95%.



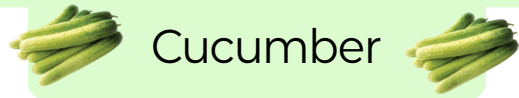
Smart Farm Management

AUTO

Manual

2025-03-27
Thursday

Am 09:50



Cucumber

SOW April 5 (D-10)

HARV July 13 (D-109)



- The farmer is located.
- Temperature is too low.



Potato

SOW April 12 (D-17)

HARV June 28 (D-94)



- Wild animal detected.
- Soil moisture is low



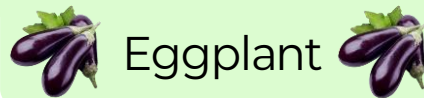
Tomato

SOW April 24 (D-29)

HARV Sep 21 (D-179)



- Disease detected.
- Temperature is too high.



Eggplant

TRANS April 16 (D-21)

HARV Oct 11 (D-199)



- Disease detected.
- High humidity detected.



Chili Pepper

TRANS April 16 (D-21)

HARV Nov 6 (D-225)



- Fire detected.

02

Crop Protection Function



Climate Anomaly Detection

Real-time sensor data is collected and analyzed to detect climate anomalies, and warning messages are provided to protect crops from sudden temperature changes or extreme weather conditions.

Accuracy of 95% or higher

Fire and Wildlife Detection

Using real-time captured images, fires on the farm are detected in advance for quick response, while preventing crop damage caused by wild animals such as wild boars or moles.



Crop Protection Function



Crop Disease Detection



Fire Detection



Wildlife Detection





Immediate fire detection upon occurrence



Predict hazardous situations in advance



Automatic emergency reporting system in critical situations



Automatic fire sprinkler system

ResNet Model

Current development accuracy: 94%

예측 결과: Wild Boar



이 이미지는 'Wild Boar'입니다.

Identification of animals
intruding into the farm



Supports farmers in taking
swift and appropriate action



Safety Management



The farmer is currently located in Farm 1.

Crop Disease Detection



Currently, disease has been detected in 4 farms.

Environmental Data Control

Target	Current
Temperature : 22	Temperature : 27
Light Intensity : 1350	Light Intensity : 1700
CO ₂ : 560	CO ₂ : 950
Humidity : 64	Humidity : 25
Soil Moisture : 0.59	Soil Moisture : 0.12
Soil pH : 6.2	Soil pH : 5.8
Heater	Humidifier
LED Light	Water Supply
CO ₂ Generator	pH Regulator

Fire Detection



Emergency Situation!
Fire detected in Farm 5.

119

Wild animal Detection



Wild boar detected in Farm 7.

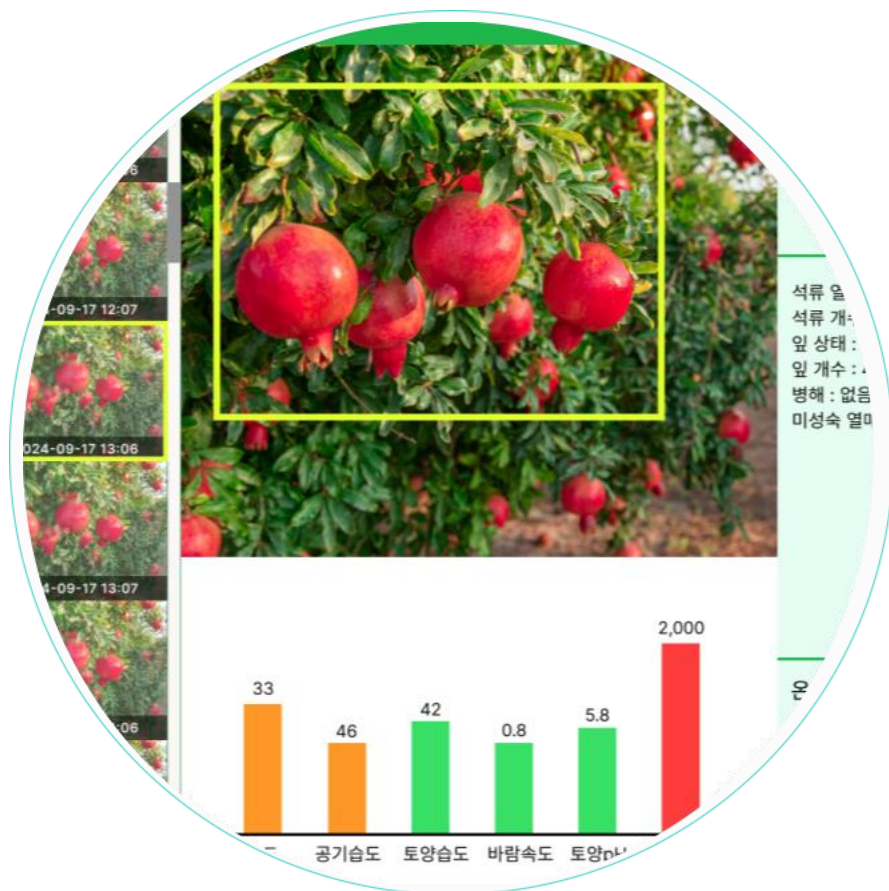


Crop Disease Detection

Real-time data captured by cameras is analyzed to detect signs of crop diseases, and warning messages are provided at the early stages of disease occurrence to support quick response.

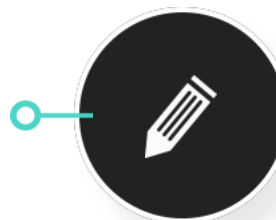
AI POMEGRANATE DISEASE DIAGNOSIS

Pomegranate Disease Diagnosis Platform Using PyTorch and CLIP Model



POMEGRANATE DISEASE IMAGE ANALYSIS | KEY POINT

BY ANALYZING PHOTOS OF THE POMEGRANATE'S APPEARANCE, THE TYPE OF DISEASE IS DIAGNOSED.



AI-Based Quantitative Diagnosis Report | KEY POINT

BASED ON AI ANALYSIS RESULTS, THE CONDITION OF THE POMEGRANATE TREE AND POMEGRANATES IS DISPLAYED IN TEXT FORMAT.

제품소개

INTRODUCTION

"AI POMEGRANATE DISEASE DIAGNOSIS"

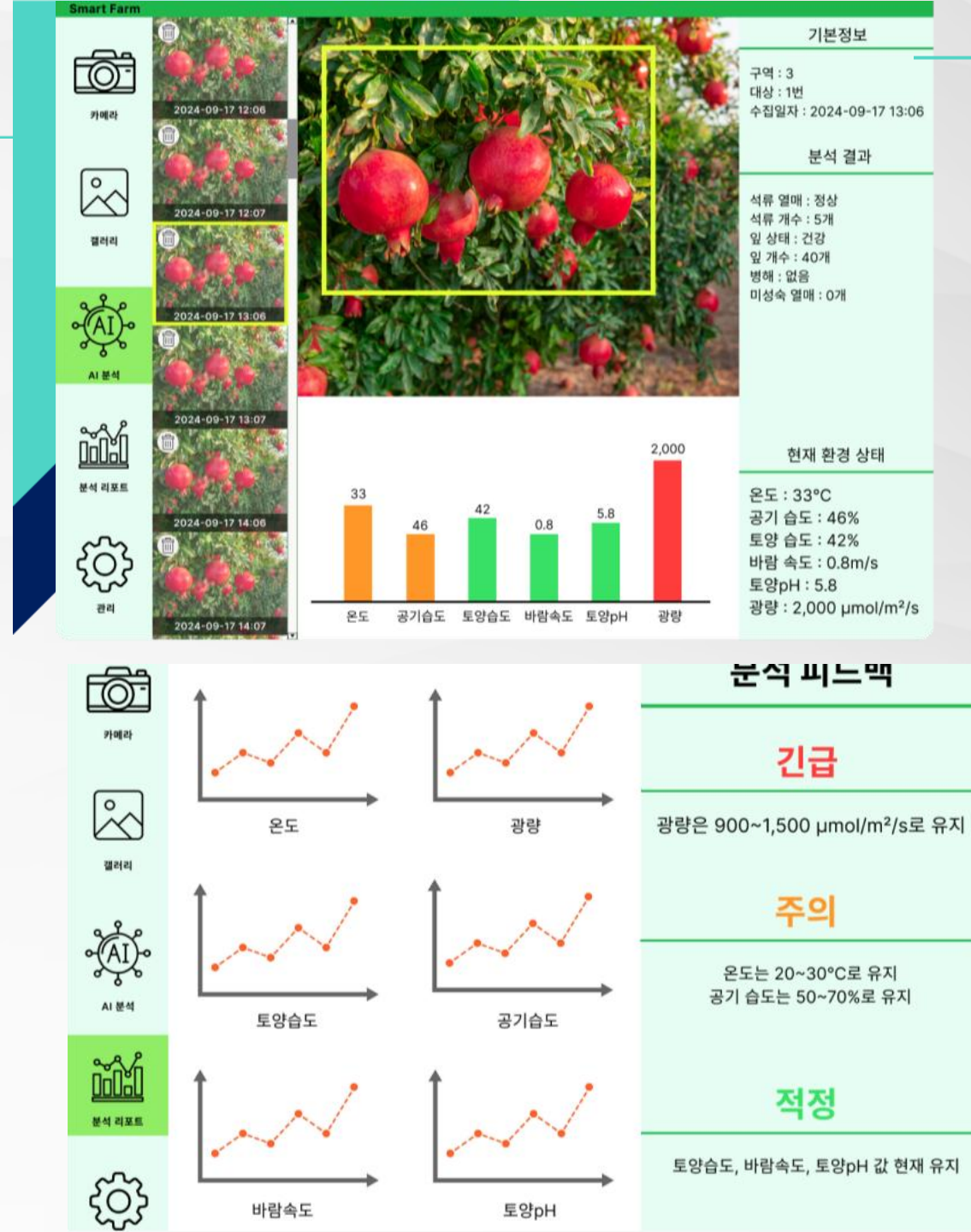
Pomegranate Disease Classification Service

Despite having different diseases,
the appearance of the symptoms can be similar,
leading to incorrect diagnoses.

However, by using this AI software,

the captured images are analyzed,

and the results are saved in a report format.



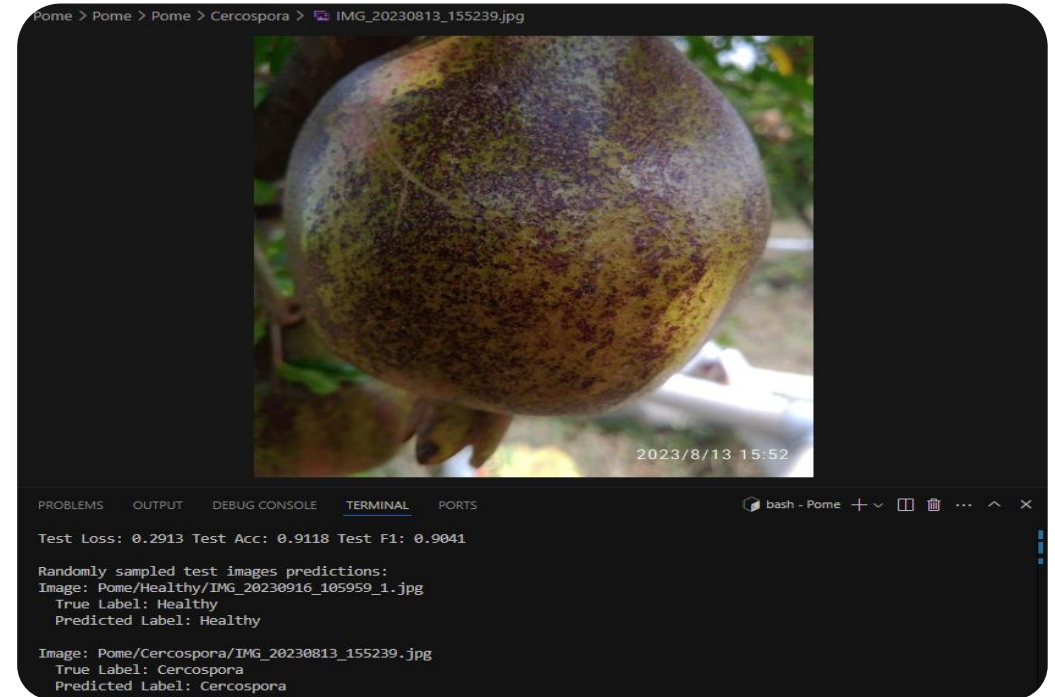
Clip Model

Current development accuracy: 93%

Crop Disease Detection



Currently,
disease has
been detected
in 4 farms.



Helps enable a **rapid** response before the disease spreads

03

Safety Management Function

Safety Management Function

Accuracy of 95% or higher

By analyzing video data of abnormal behaviors, the system detects risk situations for farmers in real time and predicts the possibility of accidents based on learned data, helping to prevent them in advance.



Safety Management



A farmer has collapsed in Farm 2.



Real-time Location Tracking of Farmers + Abnormal Behavior Detection

= Early Detection and Response to **Emergency Situations**

Safety Management



The farmer is currently located in Farm 1.

Crop Disease Detection



Currently, disease has been detected in 4 farms.

Environmental Data Control

Target

Current

Temperature : 22
Light Intensity : 1350
CO ₂ : 560
Humidity : 64
Soil Moisture : 0.59
Soil pH : 6.2

Temperature : 27
Light Intensity : 1700
CO ₂ : 950
Humidity : 25
Soil Moisture : 0.12
Soil pH : 5.8

Heater	Humidifier
LED Light	Water Supply
CO ₂ Generator	pH Regulator

Fire Detection



Emergency Situation!
Fire detected in Farm 5.

119

Wild animal Detection



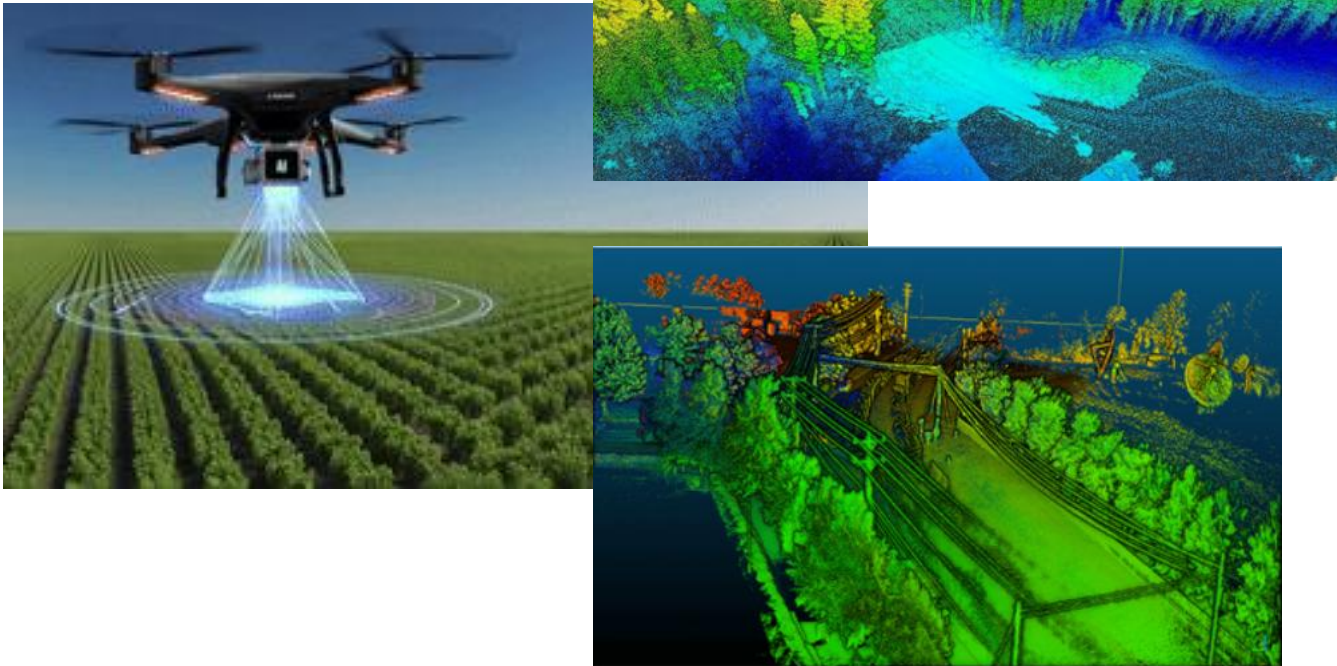
Wild boar detected in Farm 7.

04

Drone utilization Function

02

RXO Smart Farm's Drone-based 3D Scanning and Fertilizer Optimization System



Drone-Based 3D Scanning and Fertilizer Optimization System for RXO Smart Farm

The smart farm system developed by **RXO** includes precision agriculture management using drones as one of its core technologies.

In particular, the **3D scanning program** combines **LiDAR sensors** with AI-based precision models to analyze terrain and soil conditions, providing a solution for optimizing fertilizer distribution paths.

Key Features

1. 3D Scanning of Farmland Using LiDAR and AI

Utilizes drone-mounted LiDAR sensors to create 3D models of farmland, capturing elevation differences, terrain structures, and soil conditions.

2. Calculation of Optimal Fertilizer Distribution Paths and Automatic Spraying

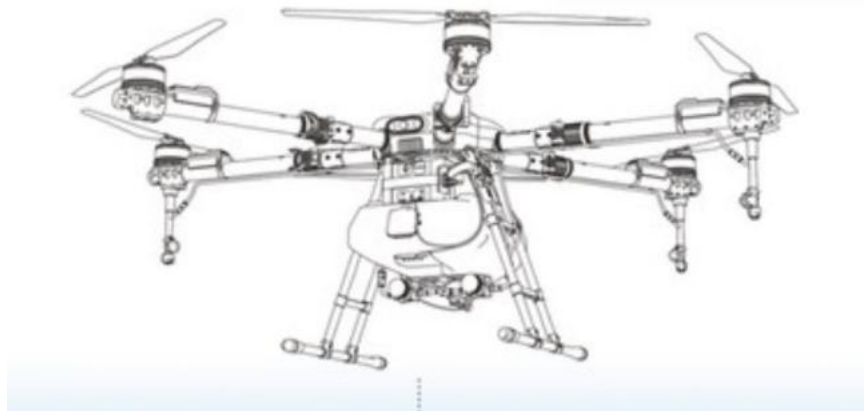
AI algorithms analyze nutrient distribution imbalances in the soil to identify areas requiring concentrated fertilization and guide automated spraying.

3. Real-Time Feedback and Data Updates

The AI model continuously improves fertilization strategies by comparing historical data with new inputs. Users can monitor real-time fertilizer usage and soil condition changes through the smart farm dashboard.

02

Providing solutions using self-made AI drones



RXO's In-House Agricultural Drone

RXO is enhancing its smart farm solutions by utilizing its self-developed agricultural drone.

This drone performs multiple functions such as **fertilizer spraying**, **3D terrain scanning**, **crop condition analysis**, and **pest detection**. Compared to commercial drones, it offers **higher performance and efficiency** at a **lower cost**, thanks to integrated AI-based optimization technologies.

Key Features of RXO's Custom Agricultural Drone

1. Cost-Effective In-House Production

- RXO manages everything from design to production, enabling supply at a lower price point than commercial agricultural drones
- Offers up to **30% cost savings** compared to typical market drones
- Fast and efficient maintenance and after-sales service supported in-house

2. AI-Based Precision Crop and Environmental Analysis

- Equipped with RXO's proprietary AI software
- Integrates **LiDAR sensors** and **multispectral cameras** for 3D analysis of farmland conditions

3. Smart Fertilizer Spraying and Automated Route Optimization

- AI analyzes the crop's nutritional status and executes **customized fertilizer spraying**
- Integrates real-time **weather and wind data** to optimize fertilizer application
- Uses **route optimization algorithms** to ensure even distribution without waste
- Supports **autonomous flight and self-navigation**

05

RXO AI Software Model

AI POMEGRANATE DIAGNOSIS

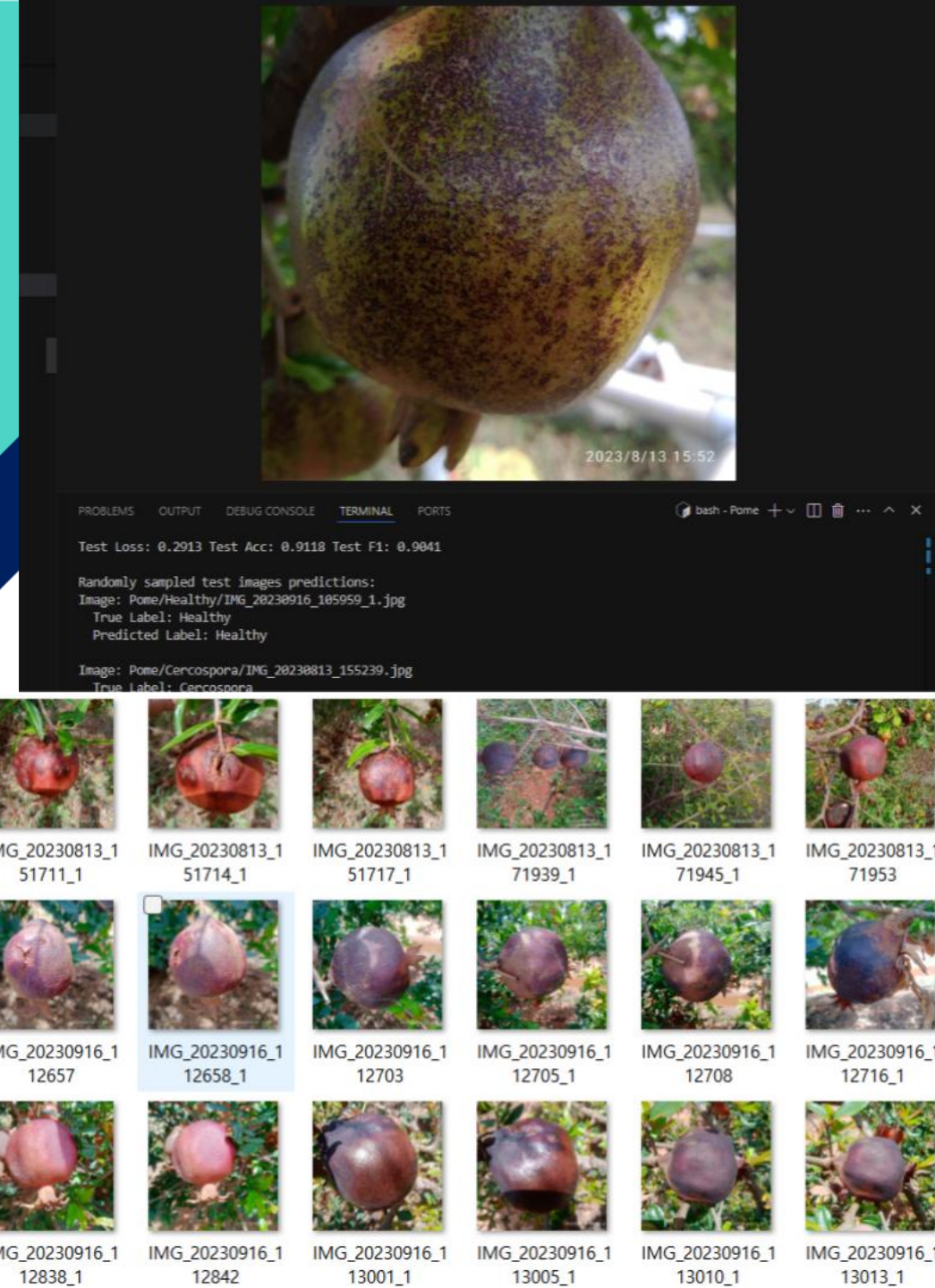
Pomegranate Disease Diagnosis Platform Using PyTorch and CLIP Model



Pomegranate Disease Classification Solution

석류 질병 분류 솔루션

We have developed an AI-based Pomegranate Disease Diagnosis service on the web called 'AI POMEGRANATE DIAGNOSIS'. This project utilizes PyTorch and the CLIP model to classify and detect the types of pomegranate diseases. In particular, the AI analyzes the appearance of the pomegranate in detail and identifies the quality condition of the pomegranate with a high accuracy of 94%.



Detecting pomegranate conditions with high accuracy

높은 정확도로 석류 상태 감지

The developed system can detect the following conditions

Alternaria (알터나리아병)

Anthraco nose (탄저병)

Bacterial_Blight (세균성 마름병)

Cercospora (서코스포라병)

Healthy (건강한 석류)



```
Epoch 1/100 - Val Loss: 0.6723 Val Acc: 0.7529 Val F1: 0.7209
Epoch time: 29.298975 sec

Epoch 2/100 - Train Loss: 0.4642 Train Acc: 0.8338
Epoch 2/100 - Val Loss: 0.3767 Val Acc: 0.8686 Val F1: 0.8554
Epoch time: 29.496396 sec

Epoch 3/100 - Train Loss: 0.2767 Train Acc: 0.9092
Epoch 3/100 - Val Loss: 0.2404 Val Acc: 0.9167 Val F1: 0.9100
Epoch time: 27.899997 sec

Epoch 4/100 - Train Loss: 0.2487 Train Acc: 0.9201
Epoch 4/100 - Val Loss: 0.2099 Val Acc: 0.9314 Val F1: 0.9227
Epoch time: 27.554767 sec

Epoch 5/100 - Train Loss: 0.1672 Train Acc: 0.9414
Epoch 5/100 - Val Loss: 0.1978 Val Acc: 0.9333 Val F1: 0.9251
Epoch time: 28.165192 sec

Epoch 6/100 - Train Loss: 0.1844 Train Acc: 0.9426
Epoch 6/100 - Val Loss: 0.1584 Val Acc: 0.9461 Val F1: 0.9396
Epoch time: 27.482469 sec

Epoch 7/100 - Train Loss: 0.1361 Train Acc: 0.9546
Epoch 7/100 - Val Loss: 0.1896 Val Acc: 0.9431 Val F1: 0.9366
Epoch time: 31.255969 sec

No improvement in validation accuracy for 1 epoch(s).
Epoch 8/100 - Train Loss: 0.1154 Train Acc: 0.9633
Epoch 8/100 - Val Loss: 0.2100 Val Acc: 0.9402 Val F1: 0.9344
Epoch time: 35.151061 sec

No improvement in validation accuracy for 2 epoch(s).
```


SMART FARM MANAGEMENT

Farm Environment Management Based on Analysis Report



Farm environment management available

농장 환경 관리 가능

The conditions that this system can control

Temperature (온도)

Light intensity (광량)

Soil humidity (토양습도)

Air humidity (공기습도)

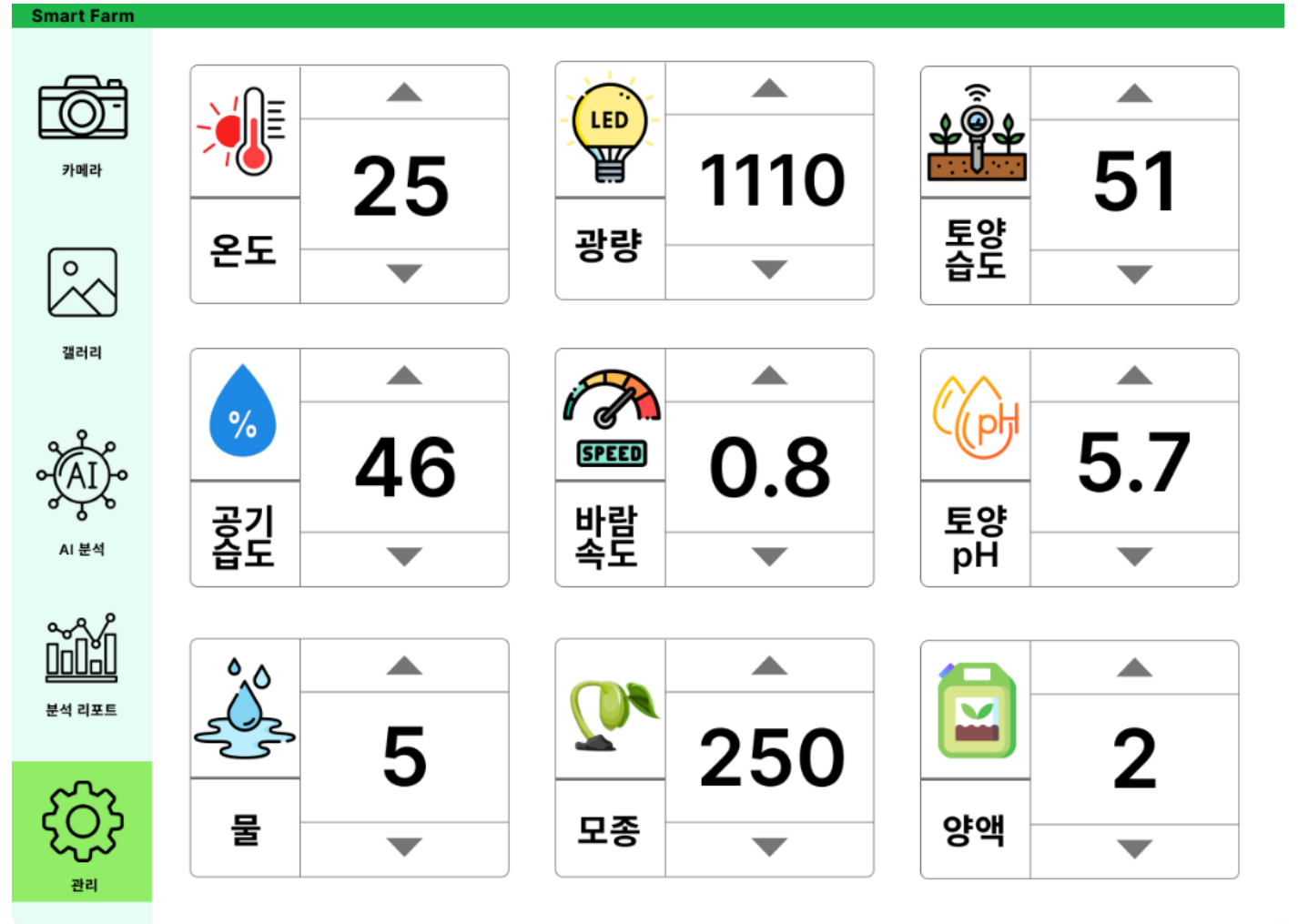
Wind speed (바람속도)

Soil pH (토양pH)

Water (물)

Seedlings (모종)

Nutrient solution (양액)



Kaggle - Pomegranate Fruit Diseases [Image] Dataset

<https://www.kaggle.com/datasets/sujaykapadnis/pomegranate-fruit-diseases-dataset>

We used a dataset of 5099 items classified into 5 types of pomegranate diseases that can be identified based on the appearance of the fruit.

Pomegranate Fruit Diseases [Image] Dataset

Data Card

Code (1)

Discussion (0)

Suggestions (0)

15

Code

Download

Pomegranate Fruit Diseases [Image] Dataset

Data Card

Code (1)

Discussion (0)

Suggestions (0)

15

Code


Download

Alternaria (886 files)

About this directory

alternaria

Suggest Edits



Data Explorer
















Version 1 (4.54 GB)

Pomegranate Fruit Disease

Pomegranate Disease

Pomegranate Disease

Alternaria


 IMG_20230813_151711...
 IMG_20230813_151714...
 IMG_20230813_151717...
 IMG_20230813_171939...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...
 IMG_20230813_171945...

Healthy (1450 files)

About this directory

This file does not have a description yet.

Suggest Edits



Data Explorer
















Version 1 (4.54 GB)

Pomegranate Fruit Disease

Pomegranate Disease

Pomegranate Disease

Healthy

 IMG_20230910_10220...
 IMG_20230910_10220...
 IMG_20230910_102218...
 IMG_20230910_10222...
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 IMG_20230910_10223...
 IMG_20230910_10223...
 IMG_20230910_10223...
 IMG_20230910_10223...

AI-Deep Learning MODEL

Contrastive Language-Image Pretraining Model

CLIP is a multimodal model that learns the relationship between images and text for tasks like image classification and mutual search.

It boasts high performance from small data to large data.

Here are the benefits of using the CLIP model for pomegranate disease classification:

1. **Multimodal Learning:** CLIP can learn the relationship between images and text, allowing for more refined classification by analyzing both text descriptions and image data of pomegranate disease conditions simultaneously.
2. **High Accuracy with Images and Text:** CLIP can compare images and text to classify disease types and conditions more accurately. By learning both text descriptions and image features together, the prediction accuracy is improved.
3. **Support for Diverse Disease Classifications:** CLIP can process both image and text information, making it advantageous for classifying and detecting a broader range of pomegranate diseases.
4. **Efficient Data Utilization:** CLIP can achieve effective learning even with limited data, making it useful for scenarios where pomegranate disease datasets are relatively small.

AI-Deep Learning MODEL

Self-made learning model clip_classifier.pth using CLIP model based on PyTorch

The PyTorch-based CLIP model learns the relationship between images and text, enabling effective processing of multimodal data.

CLIP is a deep learning model specialized in image and text processing, and it has a structure that includes an image encoder and a text encoder to learn joint representations of images and text.

RXO provides a pomegranate disease classification service. This service uses a PyTorch-based CLIP AI model and trains the model using pomegranate disease image data collected from Kaggle to build a highly accurate model.

Data preprocessing

Main data preprocessing

01

Class Imbalance Handling

1. Solving the imbalance problem:
Augment the minority class data to balance the dataset.
2. Preventing overfitting:
Create a balanced dataset to prevent overfitting.

Target classes: Alternaria, Anthracnose, Bacterial_Blight, Cercospora, Healthy

02

Data Normalization

1. Resize images to 224x224 pixels as per the CLIP model's recommended input size.
2. Convert each image's pixel values into tensors and normalize them using the specific mean and standard deviation values as recommended for CLIP.
3. Normalization values

03

Data Encoding

1. Use ImageFolder to load images based on folder structure, automatically assigning labels based on the folder names.
2. Each class is defined by the folder name, so the label is assigned based on which folder the image belongs to.
3. Split the dataset into 80:20 for training and validation sets for model training.

Model Evaluation Index

SmartFarm X RXO



01 Use local CPU

Testing Accuracy = 99.71%

After training for 10 epochs using a local CPU, the accuracy reached 99%, indicating overfitting. Since the model needs to classify new data effectively, we set a goal for improvement and plan to enhance it further.

Overfitting

02 Use local GPU

Testing Accuracy = 86.54%

We trained using a local GPU with blocks that include dense layers, dropouts, and batch normalization to enhance learning stability and prevent overfitting. Since our goal is to achieve a score of 90 or higher and an accuracy of at least 86%, we plan to further improve performance.

0.86

03 Using V100 GPU

F1_score = 0.9306
Testing Accuracy = 94.12%
Training was conducted using a V100 GPU, along with parameter modifications and the following techniques:
-EarlyStopping : Stops training if there is no performance improvement for a certain number of epochs to prevent overfitting.
-ModelCheckpoint : Saves the best-performing model to preserve the optimal model.
Additionally, the model was compiled using the Adam optimizer and the Categorical Crossentropy loss function, successfully increasing training speed and improving accuracy to 94.12%.

0.93



fire detection function

Real-time monitoring of farms with self-made models by learning fire and smoke image data to help proactively detect hazards and respond quickly

DATA

<https://www.kaggle.com/datasets/amerzishminha/forest-fire-smoke-and-non-fire-image-dataset>

Forest_Fire_Smoke_and_Non_Fire_Image_Dataset

14

Code

Download

Data Card

Code (6)

Discussion (1)

Suggestions (0)

About this directory

This file does not have a description yet.

Suggest Edits



Fire (1).gif
222.68 kB



Fire (1).jpeg
528.63 kB



Fire (1).jpg
72.8 kB



Fire (1).png
1.88 MB



Fire (10).jpeg
269.07 kB



Fire (10).jpg
73.15 kB



Fire (10).png
59.32 kB



Fire (100).jpeg
457.45 kB



Fire (100).jpg
45.26 kB



Fire (100).png
21.77 kB

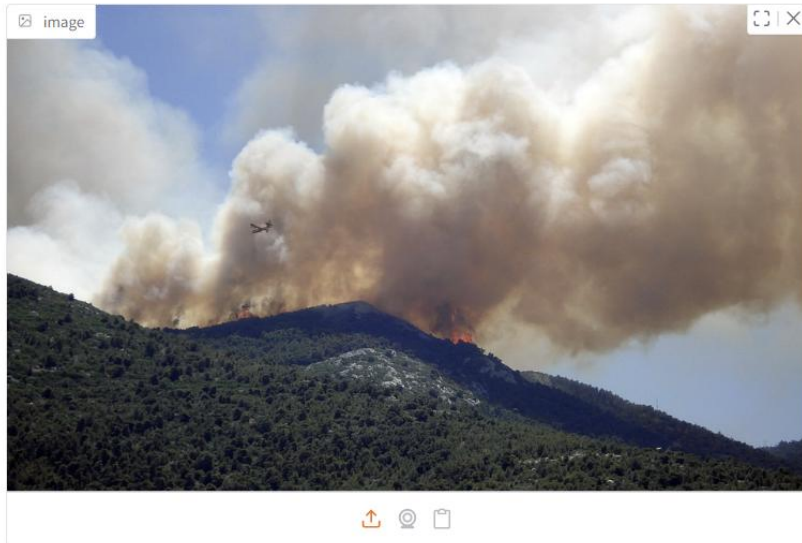
- FOREST_FIRE_SMOKE_AN
 - test
 - train
 - Smoke
 - fire
 - non fire

Summary

- 42.9k files

yolov8n-cls.pt Fine tuning to model

이미지를 업로드하면 fire / smoke / non_fire 중 하나로 분류해줍니다



output

Smoke (98.9%)

Flag

Clear

Submit



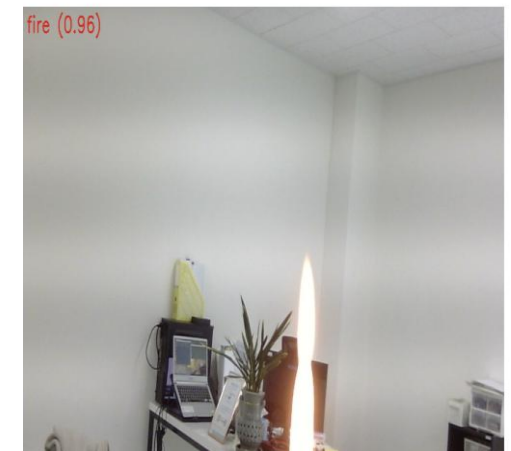
Create a fire classification web when entering images

Create fire detection and classification web with real-time rstp camera

실시간 화재 분류



실시간 화재 분류





Fine flame detection

Learn micro-flame image data to help prevent the spread of large fires with self-made models

DATA

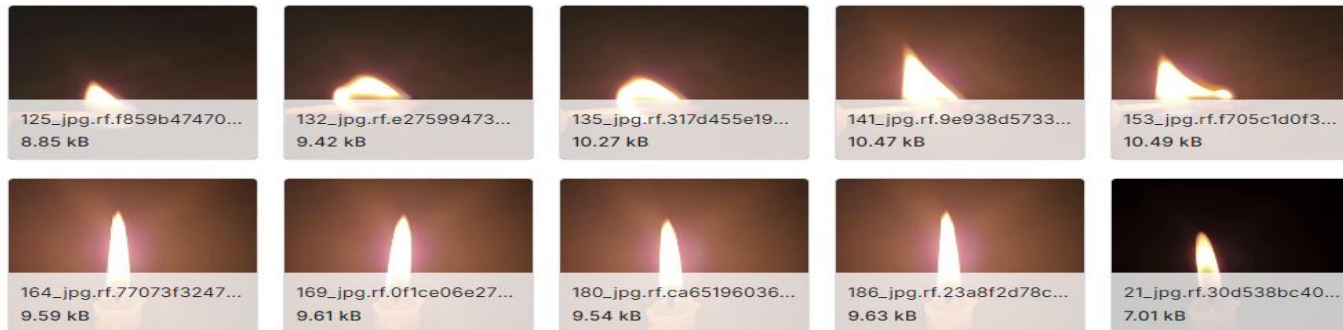
<https://www.kaggle.com/datasets/sreemantabarman/flame-dataset-candlelightermatch-stick-flames>

Flame Dataset (Candle,Lighter,Match Stick Flames)

Data Card Code (0) Discussion (0) Suggestions (0)

View more

images (101 files)



Data Explorer

Version 1 (165.63 MB)

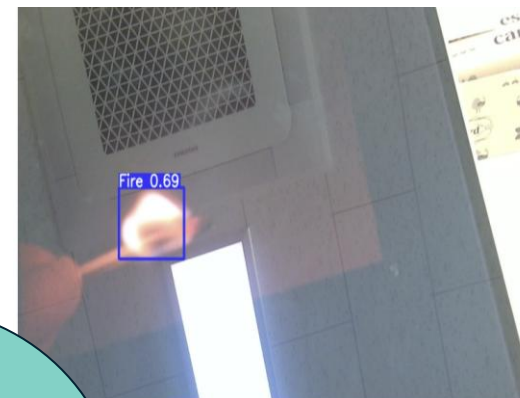
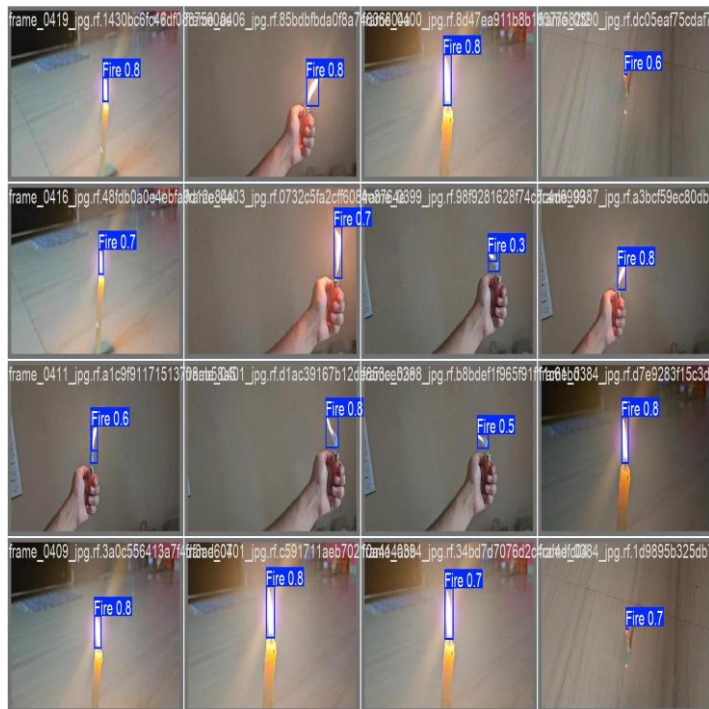
- Flame
 - test
 - images
 - labels
 - train
 - valid
 - data.yaml

Summary

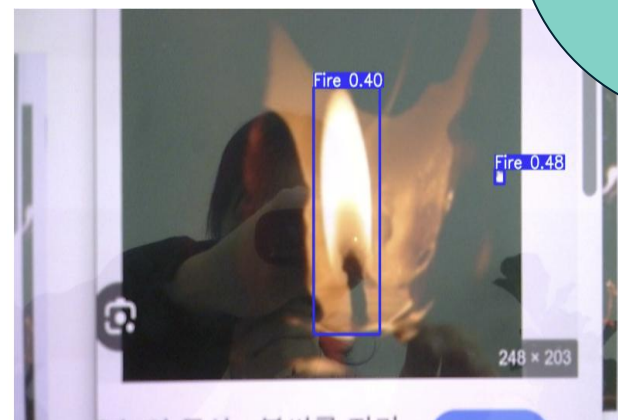
- 16.8k files

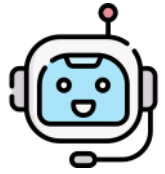
Fine flame detection

- yolov8n.pt Fine tuning -



Bounding Box
X
Probability





Chatbot function

Create a chatbot for smart farms by fine tuning Google/gemma-7b

DATA

<https://huggingface.co/datasets/KisanVaani/agriculture-qa-english-only>

question

string · lengths



answers

string · lengths



why is crop rotation important in farming?

This helps to prevent soil erosion and depletion, and can also help to control pests and diseases

What farming practice helps prevent soil erosion?

Crop Rotation

what is crop rotation

Crop rotation is the practice of growing a series of different crops in the same area over several seasons

what are the different methods of irrigation?

surface irrigation, drip irrigation, and sprinkler irrigation

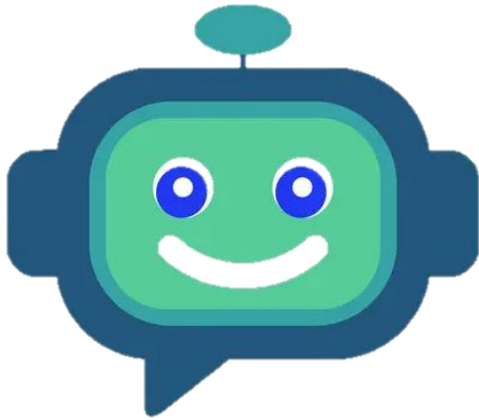
why is soil health vital?

Soil health is critical to crop growth and productivity, as it provides the necessary nutrients and support for plants to...

what are the causes of soil degradation?

erosion, compaction, and nutrient depletion

Chatbot



English questions should be asked to output appropriate answers

Gemma Chatbot

나: What recommendations do you have for improving crop growth this week?

Gemma: What recommendations do you have for improving crop growth this week . 1 . **Ensure proper fertilization:** Apply recommended fertilizers, including potassium and phosphorus, to promote healthy plant growth and increase resistance to disease . 2 . **Implement proper irrigation practices:** Provide adequate moisture to crops, avoiding waterlogging, to maintain optimal soil conditions for growth . 3 . **Practice crop rotation:** Rotate crops to prevent soil depletion and reduce the risk of disease buildup . 4 . **Monitor pest and disease levels:** Regularly inspect crops for signs of pests and diseases and take appropriate control measures if necessary . 5 . **Adjust planting dates:** Consider adjusting planting dates to align with favorable weather conditions and reduce the risk of crop damage . 6 . **Implement crop protection measures:** Use appropriate fungicides, insecticides, and other protective measures to manage pests and diseases effectively . 7 . **Consider crop insurance:** Consider investing in crop insurance to mitigate financial losses resulting from unfavorable weather conditions or pest and disease outbreaks .

질문을 입력하세요...

보내기

Future Plans



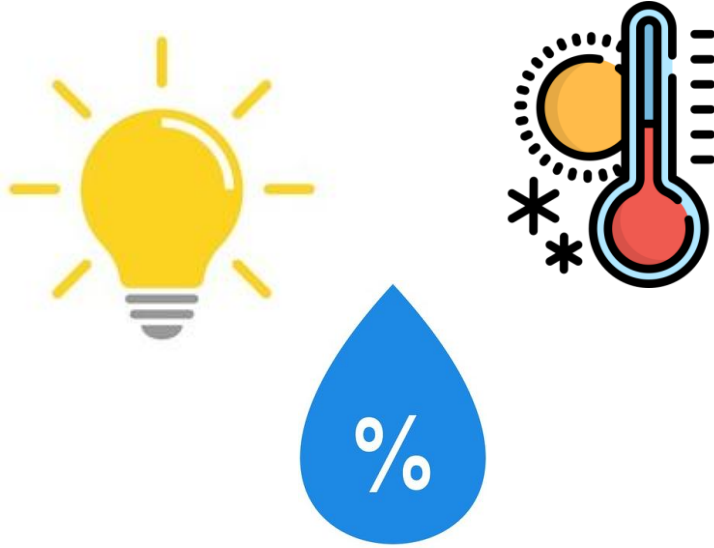
💡 Establishment of an Automated Crop Harvesting System

- Automated Harvesting Robot
- Quality Classification and Grading

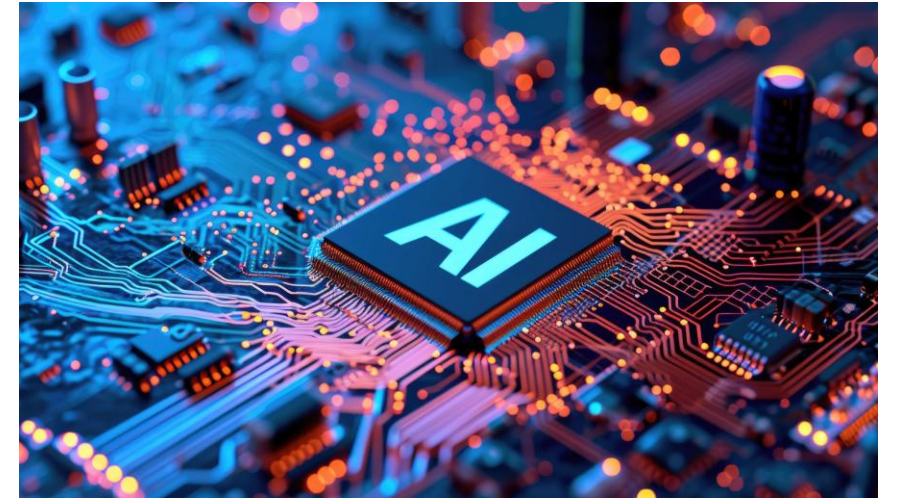
💡 Establishment of Post-Harvest Management System

- Automated Sorting and Packaging System
- Management and Logistics Optimization

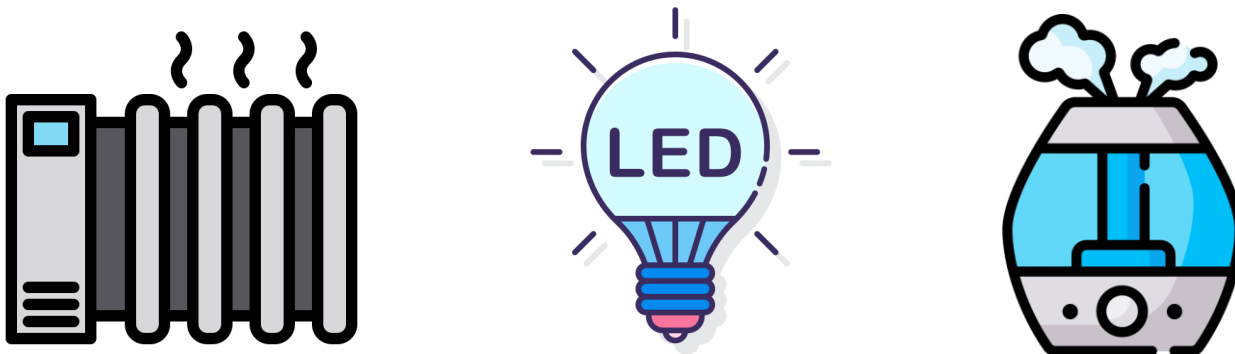
1. Real-time collection of environmental information

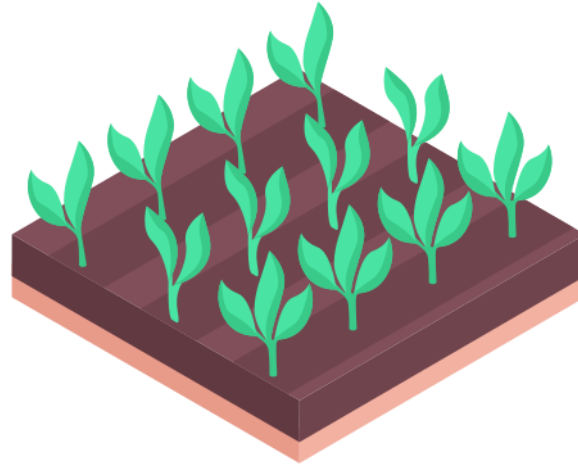


2. Creating the optimal cultivation environment using AI analysis



3. Maintaining the optimal environment for crop growth





“

From farm automation to crop data-driven customized management,
SmartFarm provides an integrated solution on a single platform.

”



THANK YOU

RXO Co., Ltd.