HRC
HELPER ROBOTECH CO., LTD.

'Helper RoboTech Co.,Ltd', the leading company in high quality seedlings

# Smart Nursery System

HRC
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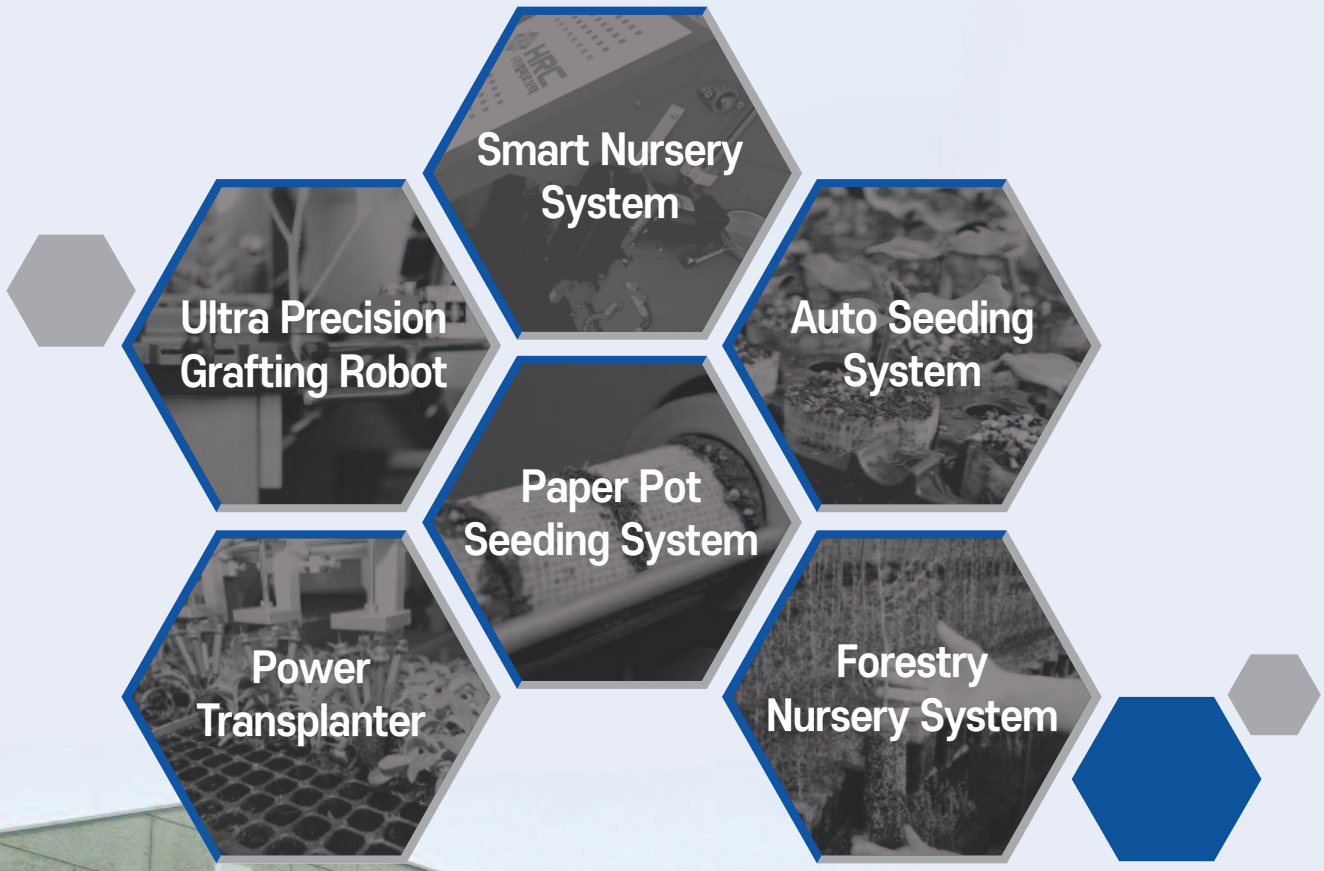
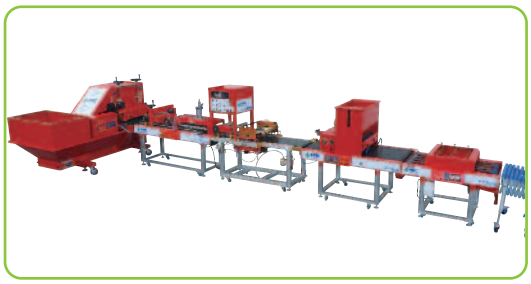
We developed an "**Auto Seeding System**", a fruit vegetable grafting robot so we were in the next generation sector of '**World-class product and production company**' and we succeeded in developing "**Paper Pot Seeding System**" in 2016, also "**Auto Seeding System(Drum)**" in 2019, We are building the infrastructure for smart agriculture**(Smart Nursery System)**.




# Smart Nursery System

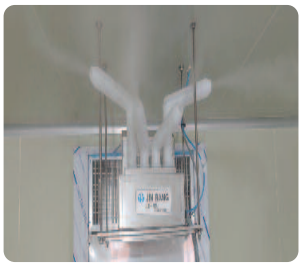
## What is "Smart Nursery System"?

### *One Integration platform to making a "Good Seedling"*



Seeding System

+



Germination System

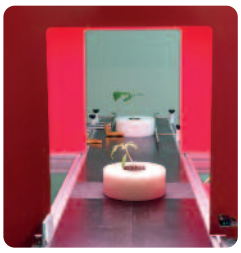
Precision Grafting System

+

Growing (Flexible Seedling Bed)

Healing Chamber

+



Growing Screening System

RFID CHIP

Control Room

**Every Steps Controlling & Monitoring**

**for**

***High Quality Seedling***

# Smart Seeding Machine Collection of Production History Information System

## Smart seeding machine collection of production history information


Auto seeding line


RFID Reader


RFID Chip

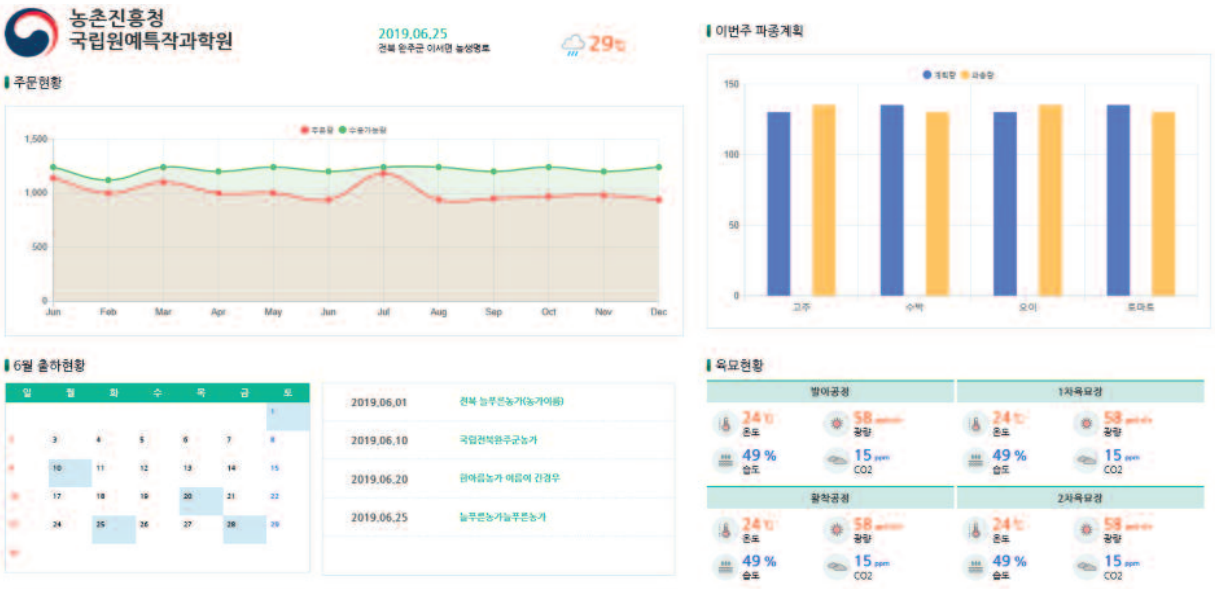

Bar code Reader


Touch Panel


Control room

→ Seeding information Bar code(16numeric) create and recognition
→ Seeding-work production history process build(Data traceable)

## Analog seedling-diary changes to Digital




→ Big-data application(Seedling-information D/B securing)
→ Create a seedling-control system step by step

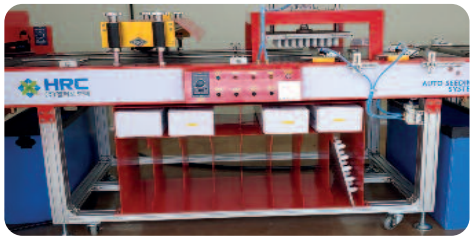
# Smart Seeding Machine Collection of Production History Information System

## Process of Smart seeding machine collection of production history information system

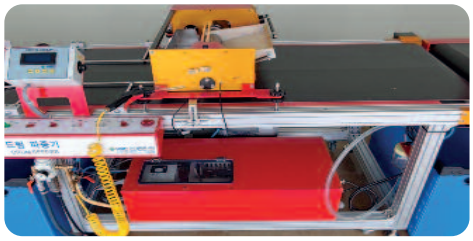
### 1 Attached Tray Bar code

### 2 Smart Filler

### 3 Clean Conveyor



### 4 Drum Seeder

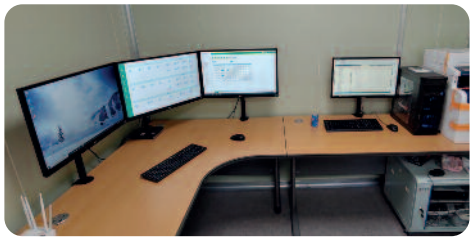


### 5 Clean Top Dresser

### 6 Clean irrigator & Conveyor

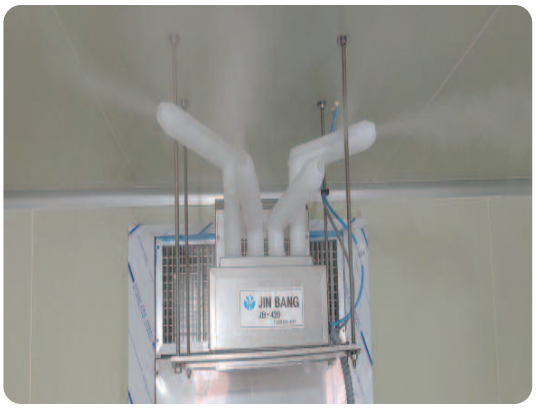
### 7 Seedling-bed + RFID

### 8 Control room



# Smart Germination room Environment Control System

## Seedling factory first step : Maintain uniform environmental condition

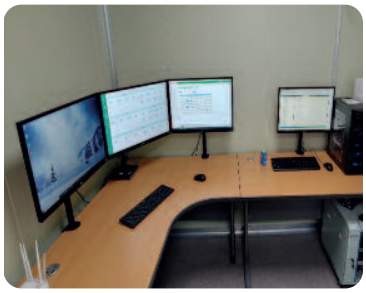




→ Optimal environmental condition for uniform germination are essential!
→ Formation of production base for high quality plug

## Environmental Sensor + Touch Panel → Control room

Environmental sensor in Germination room

Touch Panel



Control room(Collecting data)

→ Big-data application(Germination information D/B securing)
→ Create a seedling-control system step by step

# Smart Germination room Environment Control System

## Process of smart germination room environment control system

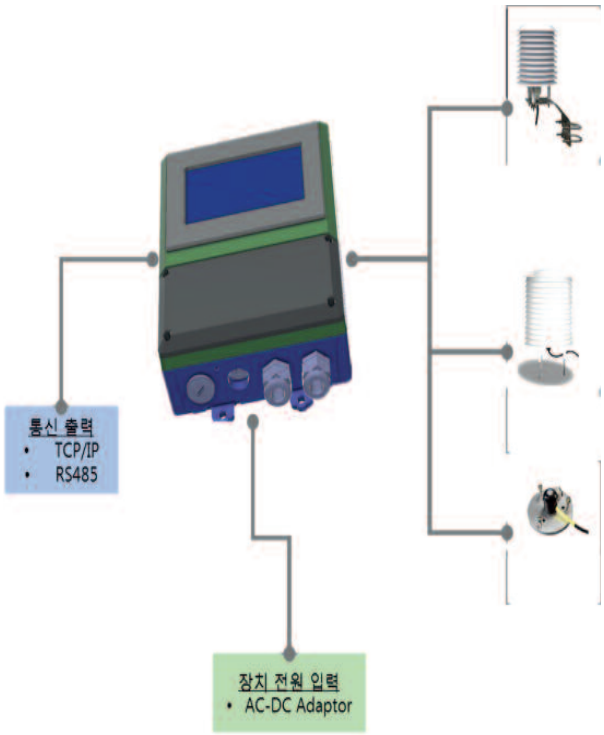
2 Sensor data reply

3 Sensor data send

Environmental sensor in Germination room → ← Touch panel → ← Control room

1 Sensor data request

4 Send a Temperature/ Humidity data




**Sensor → Touch panel**

- Send a data

**Panel → Control room**

- Pass a data & Received a control room data

**Control room → Touch panel**

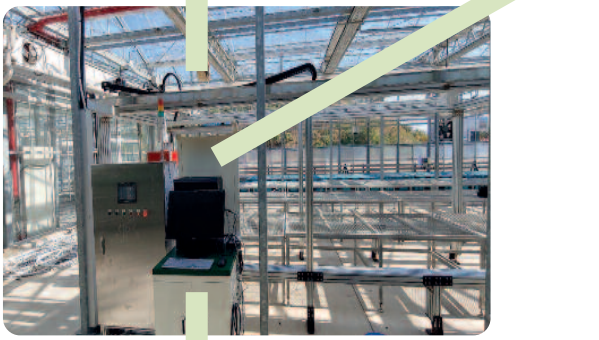
- Received a sensor data & Send a control data

**Control room**

- Control the indoor environment based on the data received

# Vegetable Seedling Growth Monitoring System Using Video Apparatus

## Composition of vegetable seedling growth monitoring system using video apparatus



**1** Outer Frame

**2** Moving Camera
: 3-axis(X, Y, Z axis) movable

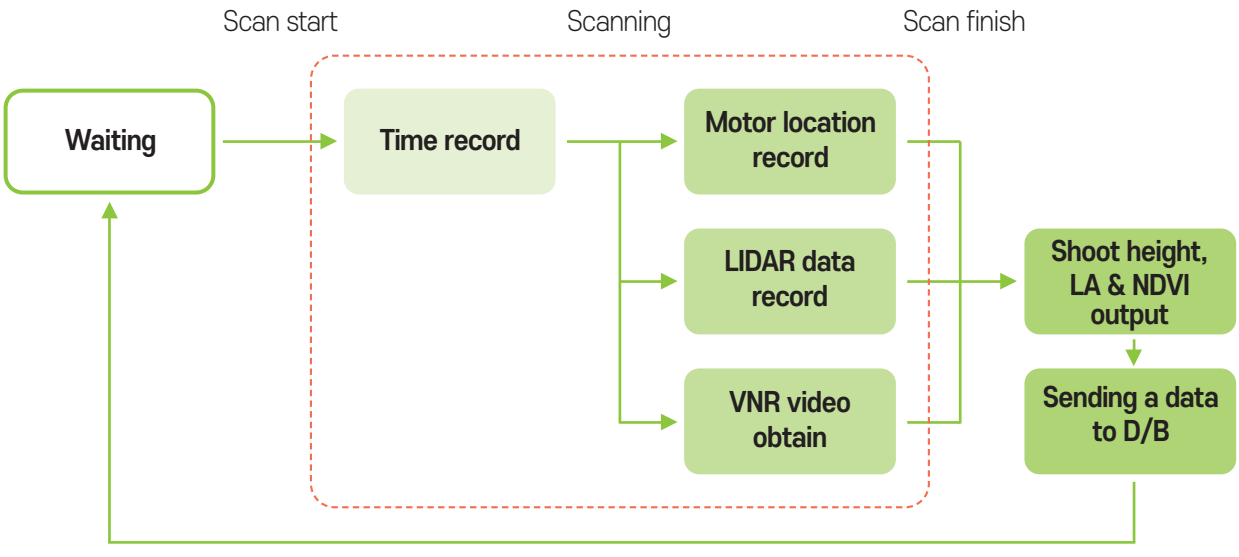
**3** Video apparatus
: collect data(Plant height, Leaf area)

LIDAR camera

VNIR camera

**4** Panel & PC → Control moving camera
→ Seedling growth data storage

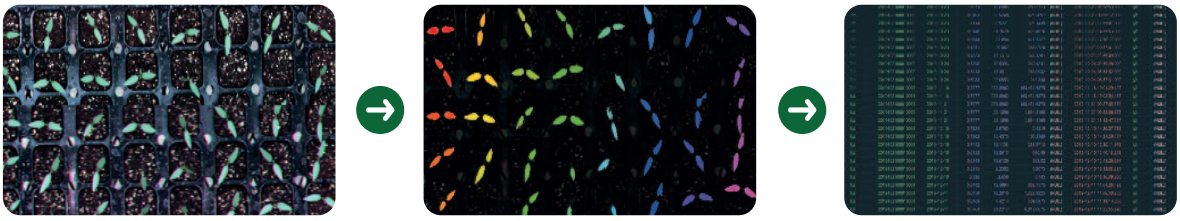
## Process of vegetable seedling growth monitoring system using video apparatus



# Vegetable Seedling Growth Monitoring System Using Video Apparatus

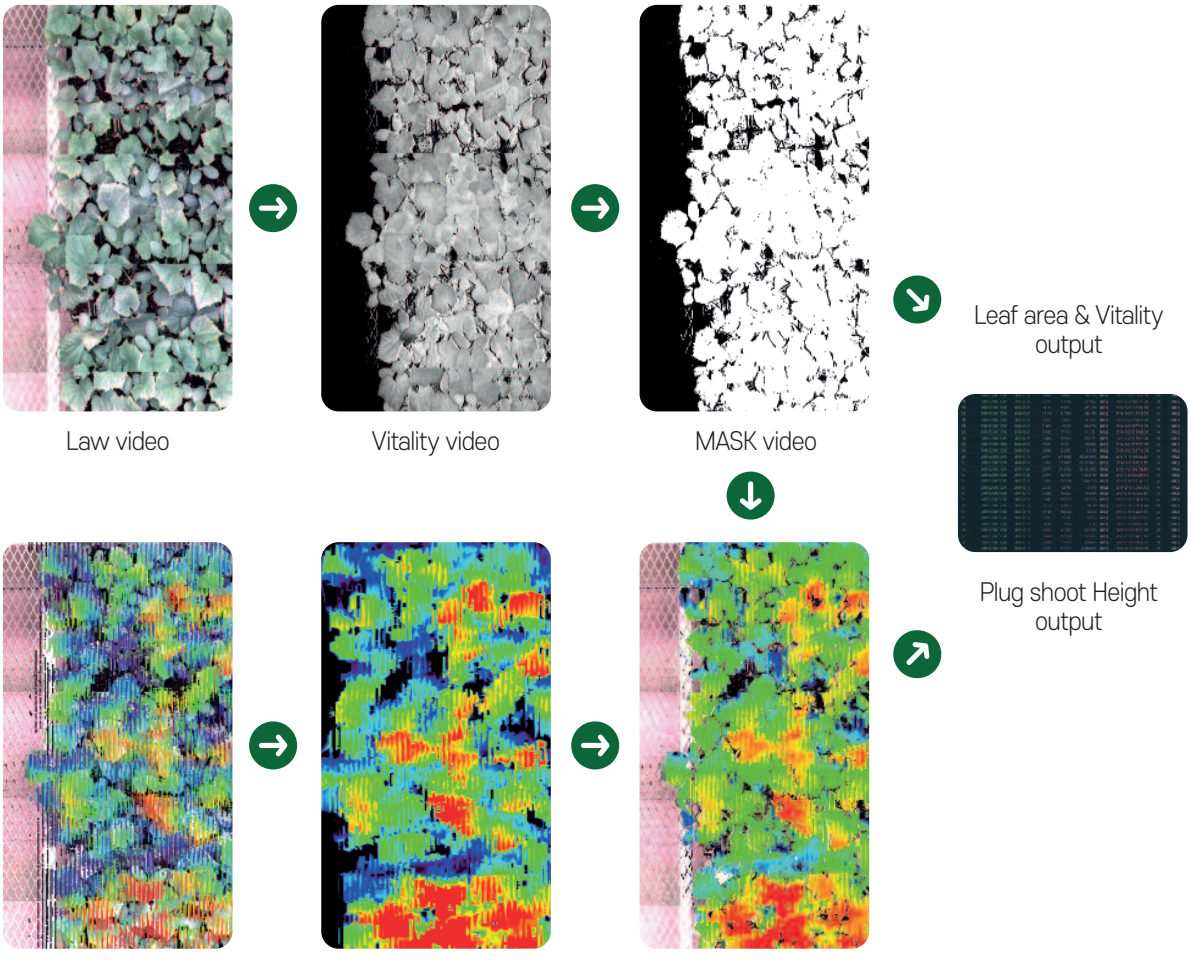
## Collecting Data

- Differentiation of Vegetable seedling germination



Law video | Germination sensing video | Germination rate output

- Vegetable seedling growth information collecting



Law video | Vitality video | MASK video | Leaf area & Vitality output | Plug shoot Height output

LIDAR camera Law video | Height video | Plug shoot height video

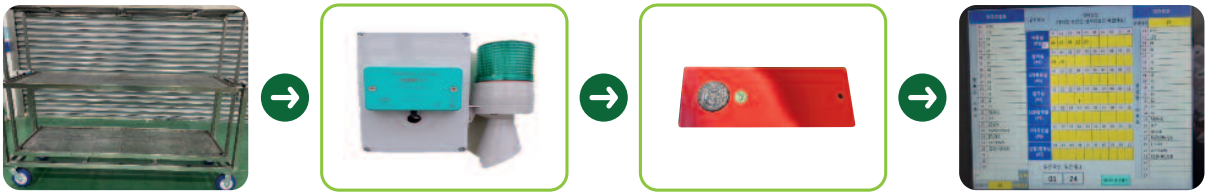
# Alignment Transition Moving Seedling-bed Information Collection System

## Create a alignment transition moving seedling-bed

Vertical type　　Changing　　Horizontal type

→ Changing a distribution transfer unit (Unit : A Tray → Seedling-bed)
→ Productivity improvement through growth environment difference decrease

## Alignment transition moving seedling-bed + RFID system

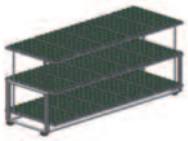


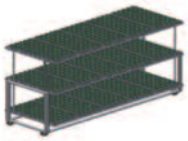
Alignment transition moving seedling-bed　　RFID reader　　RFID chip　　Distribution transfer unit recognition & storage

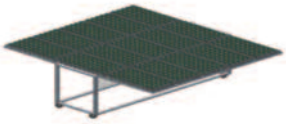
→ Alignment transition moving seedling-bed + RFID system
→ Trace of Seedling factory transfer unit process

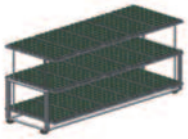
# Alignment Transition Moving Seedling-bed Information Collection System

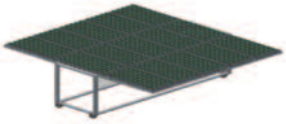
## Process of alignment transition moving seedling-bed information collection system

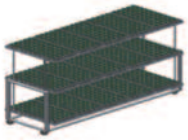
1 Seeding room —  Vertical type

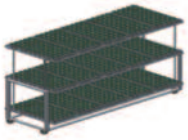
2 Germination room —  Vertical type

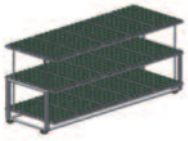
3 First seedling —  Horizontal type

4 Grafting room —  Vertical type

5 Second seedling —  Horizontal type

6 LED healing room —  Vertical type

7 Quality assessment —  Vertical type

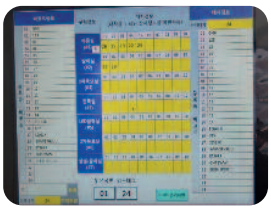
8 Shipment —  Vertical type

RFID reader

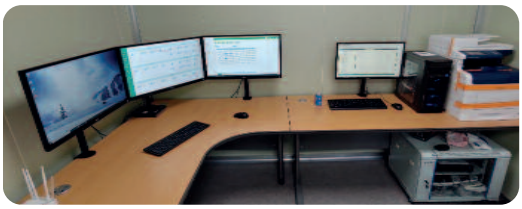
RFID chip

Bar code reader

Information recognition



Information recognition by course



**Core technology**

Always maintain Horizontal/Vertical alignment at any angle to prevent pour out soil in tray in process alignment transition
(Vertical type ⇔ Horizontal type)

# Smart LED Healing room Environment Control System

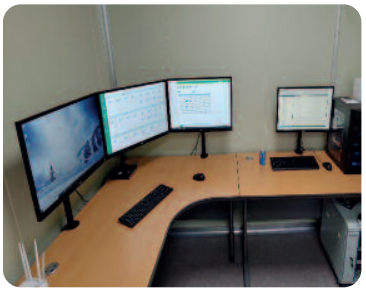
## Seedling factory first step : Maintain uniform environmental condition

→ Optimal environmental condition for uniform grafting-healing are essential!
→ Formation of production base for high quality and grafting plug

## Environmental Sensor + Touch Panel → Control room

Environmental sensor in LED healing room

Touch Panel



Control room(Collecting data)

→ Big-data application(Grafting & Healing information D/B securing)
→ Create a seedling-control system step by step

# Smart LED Healing room Environment Control System

## Process of smart LED Healing room environment control system

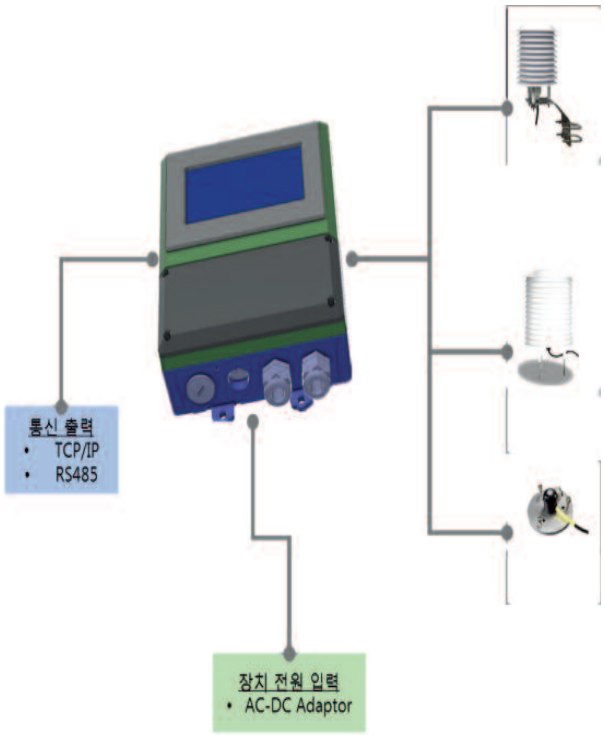
2 Sensor data reply

3 Sensor data send

Environmental sensor in LED Healing room → ← Touch panel → ← Control room

1 Sensor data request

4 Send a Temperature/ Humidity & LED data




**Sensor → Touch panel**

- Send a data

**Panel → Control room**

- Pass a data & Received a control room data

**Control room → Touch panel**

- Received a sensor data & Send a control data

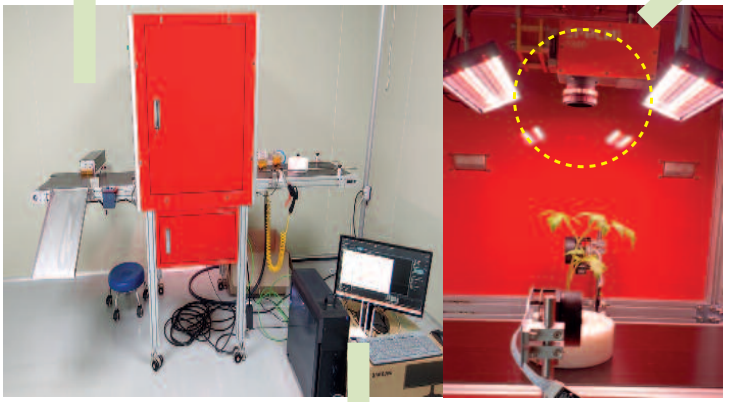
**Control room**

- Control the indoor environment based on the data received

# Vegetable Seedling Determining Quality and Screening System Using Video Apparatus

## Composition of vegetable seedling determining quality and screening system using video apparatus

**1** Outer Frame



**2** Video apparatus
: Ultra-spectral camera & LIDAR camera

**3** Dual LIDAR camera

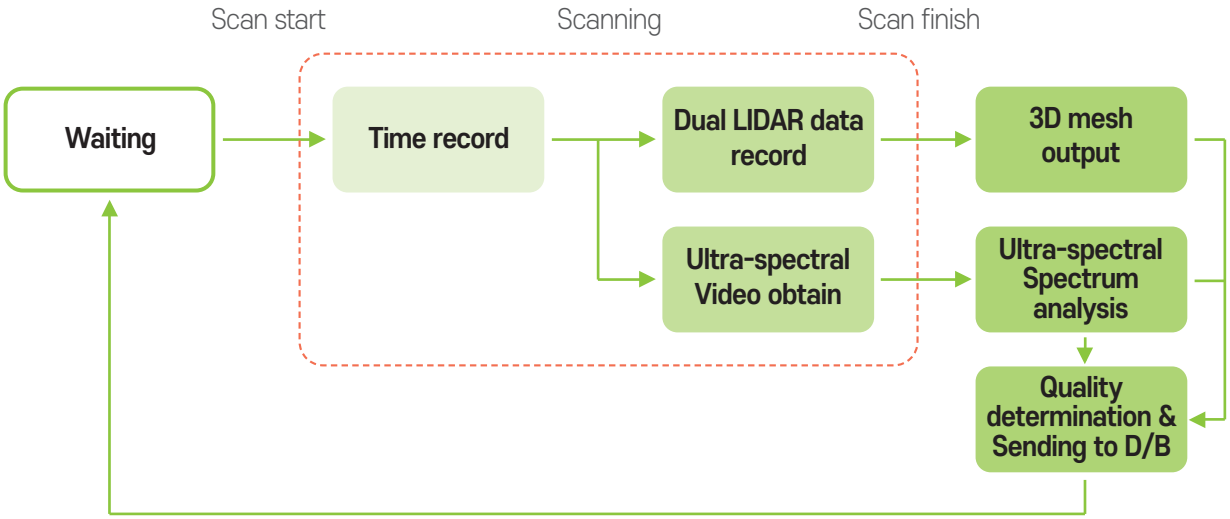
→ Plug external matrix (shoot height, Leaf area)

**4** Ultra-spectral camera

→ Plug internal matrix (NDVI)

**5** PC : Collecting a data of plug quality and determining

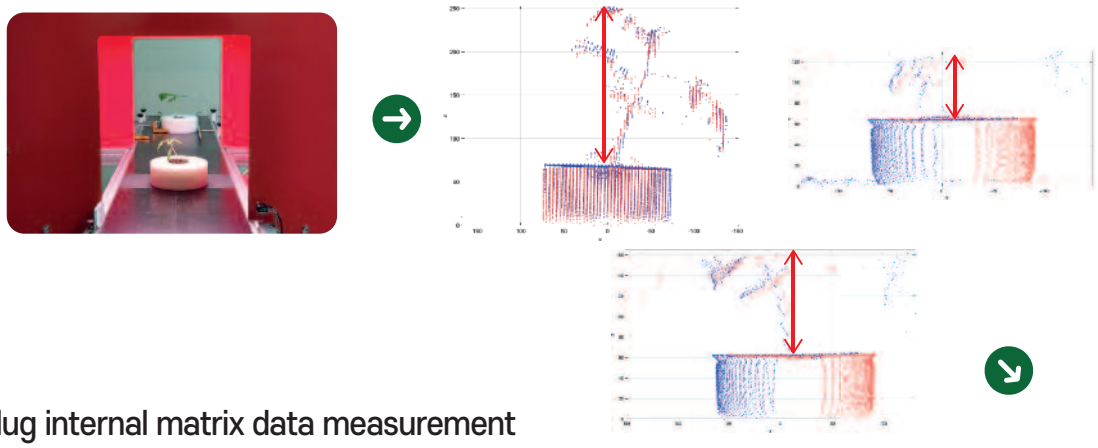
## Process of vegetable seedling determining quality and screening using video apparatus



# Vegetable Seedling Determining Quality and Screening System Using Video Apparatus

## Collecting Data

- Plug external matrix data measurement

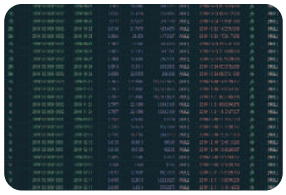


- Plug internal matrix data measurement

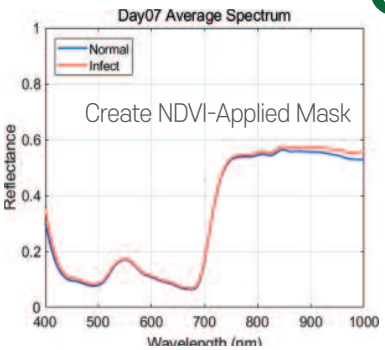
Ultra-spectral RGB video

Create NDVI-Applied Mask

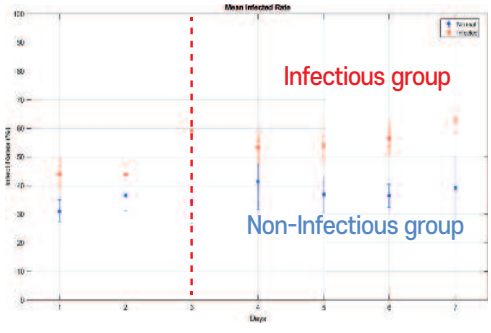
Plug size calculation



Identification of disease infection




Ultra-spectral data analysis procedure



“

Your ideal partner for
**‘high Quality seedling’** Production :
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