

# ***SMART FEBS in GNU***

*July 2018*

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# Information of GNU

*Facility Environment Bio-Systems Lab. : F.E.B.S. Lab.*



The Flagship National University in Gyeongnam



경상대학교  
GYEONGSANG NATIONAL UNIVERSITY

# The Flagship National University in Korea

Representing Gyeongnam



## Information of GNU

慶尙大學校

A map of South Korea showing travel routes from major cities to Jinju, where GNU is located. The routes and travel times are as follows:

- Seoul to Jinju: 1.5 hr
- Daejeon to Jinju: 2.0 hr
- Daegu to Jinju: 1.5 hr
- Busan to Jinju: 1.5 hr
- Kwangju to Jinju: 1.5 hr
- Tongyeong to Jinju: 1.5 hr

The map also includes several inset images showing scenic views of the university campus and surrounding areas, such as a bridge over water, a traditional Korean building, a mountain landscape, a stone statue, and a view of mountains from a distance.

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# *Founding of FEBS*

*Facility Environment Bio-Systems Lab. : F.E.B.S. Lab.*



# Members



## Professor

*Hyeon Tae, Kim*

.....●

## Ac. Professor

*Kyeong Moon, CHOI*

.....●

## Doctor Course

◆ *Waqas qasim*

◆ *Jayat, kuma*

◆ *Eun Gyu, Choi*

◆ *Eung Gyu, Kim*

◆ *Gyeong Geun, Lee*

◆ *Byung Ok, Jin*

◆ *Byeong Eun, Moon*

.....●

## Master Course

◆ *FranK M.*

◆ *Fawad*

◆ *YongJin Lee*

◆ *JiHoon Pack*

◆ *SoWeon Choi*

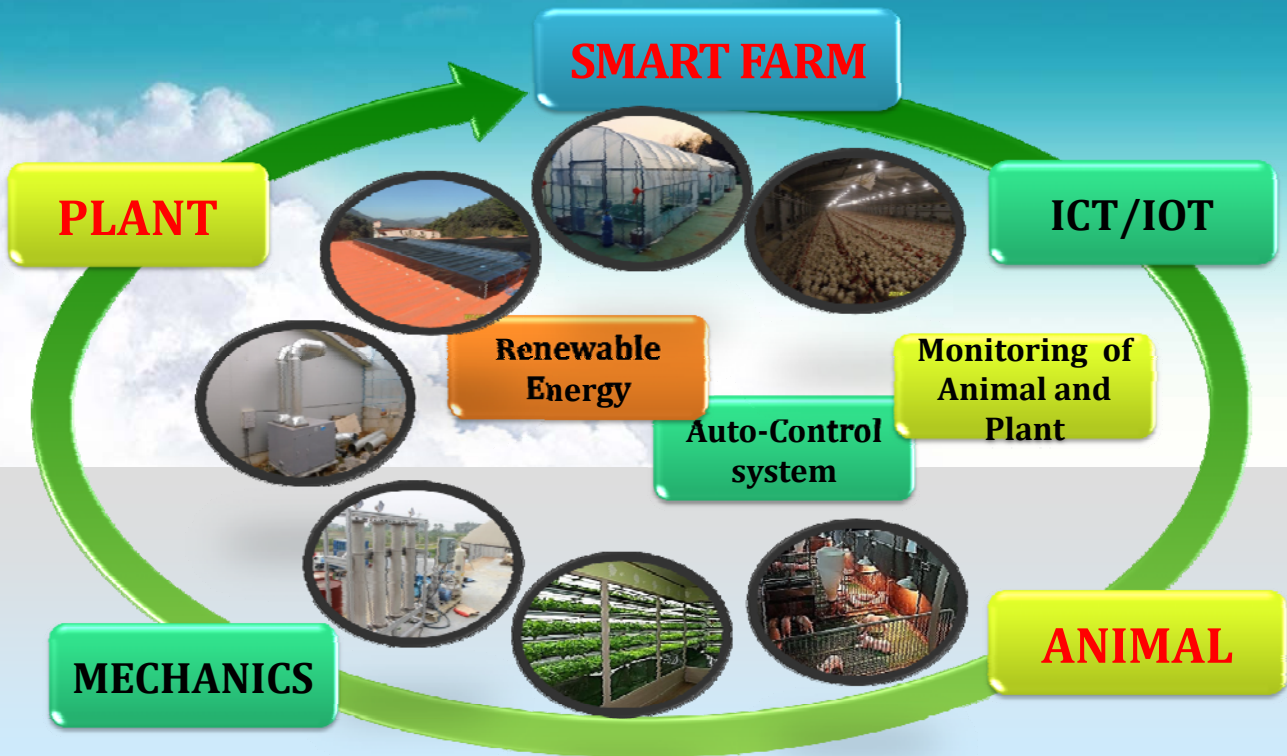
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# Activating of SMART FEBS

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# Research of FEBS Lab.



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# Animal+ICT

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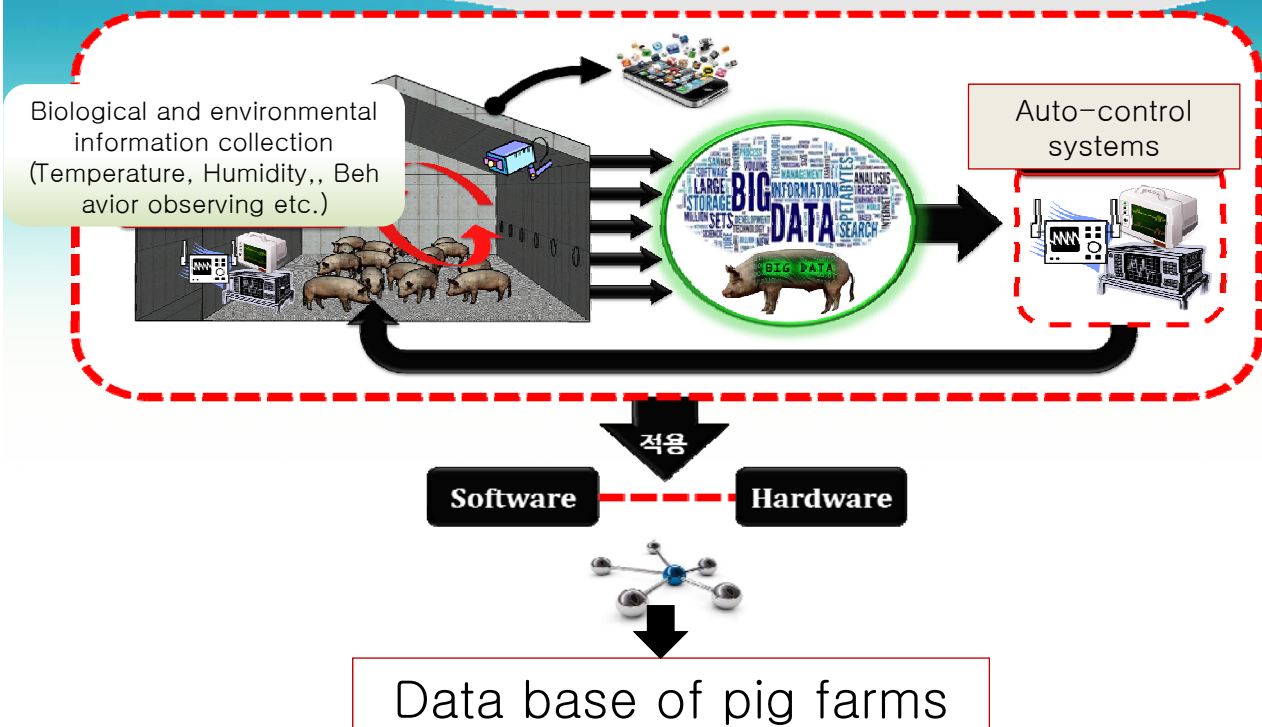
# ICT management of Swine's Development Modeling



- Study the relations of Environment and Growth with ICT technology of the pig farming's on closed-system

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## Evaluation the Environmental Indoor livestock effect on adaptive physical pig body



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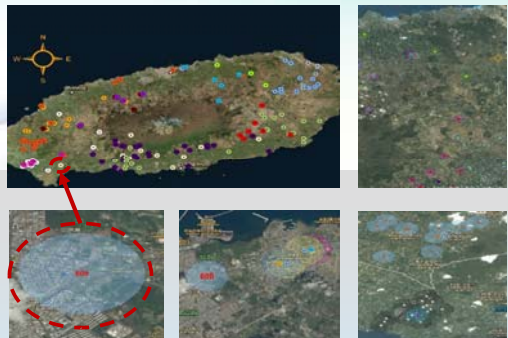
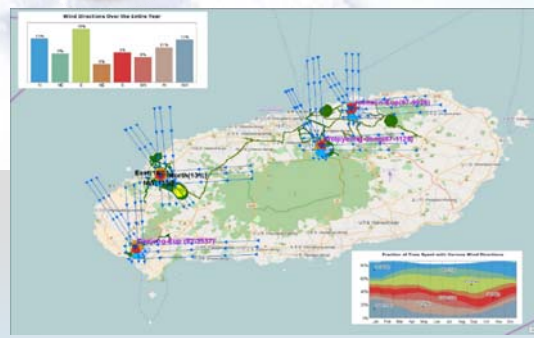


# Vehicle movement model prediction for FMD



FMD path of infection

- Compost and feed
- Vehicle



**Car no. Symbols**

- 90-0432
- 93-0557
- 93-0373
- 97-0798
- 97-0192
- 97-0926
- 97-0158
- 97-0187
- 97-0626
- 97-0771
- 97-0038
- 97-0105
- 97-0125
- 97-0915

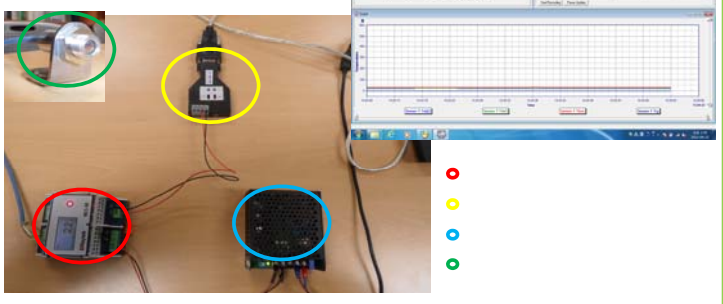
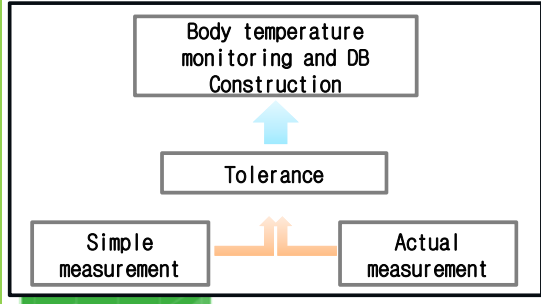
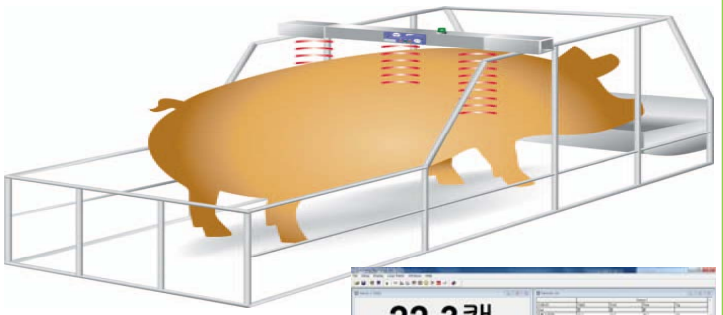
**500 Meter Area Symbols**

- 500
- 500
- 500
- 500
- 500
- 500
- 500
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- 500
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➤ Development of Livestock Vehicle Movement Model through GIS Analysis.

Facility Environment Bio-Systems Lab. : F.E.B.S. Lab.

## Animal body temperature



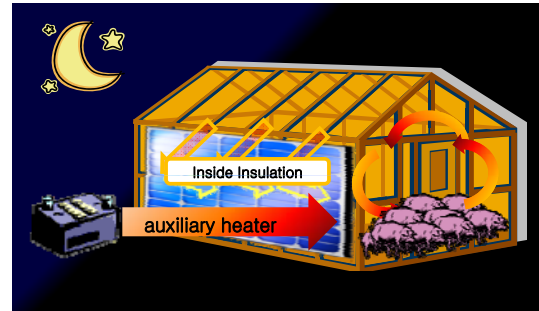
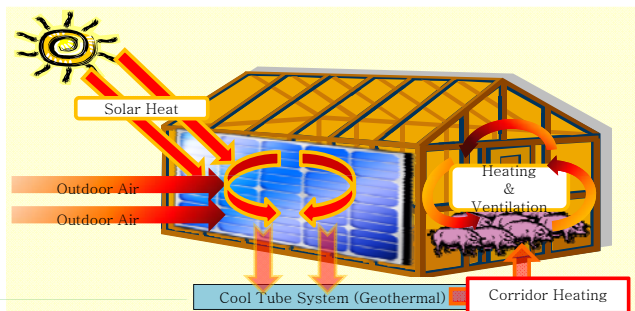
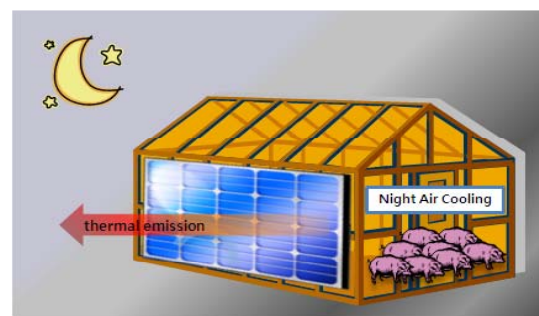
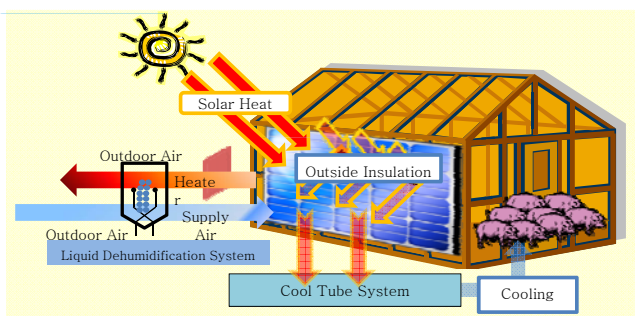
❖ Prediction and abnormal findings of dorsum temperature measurement of pig



# Animal+Env.

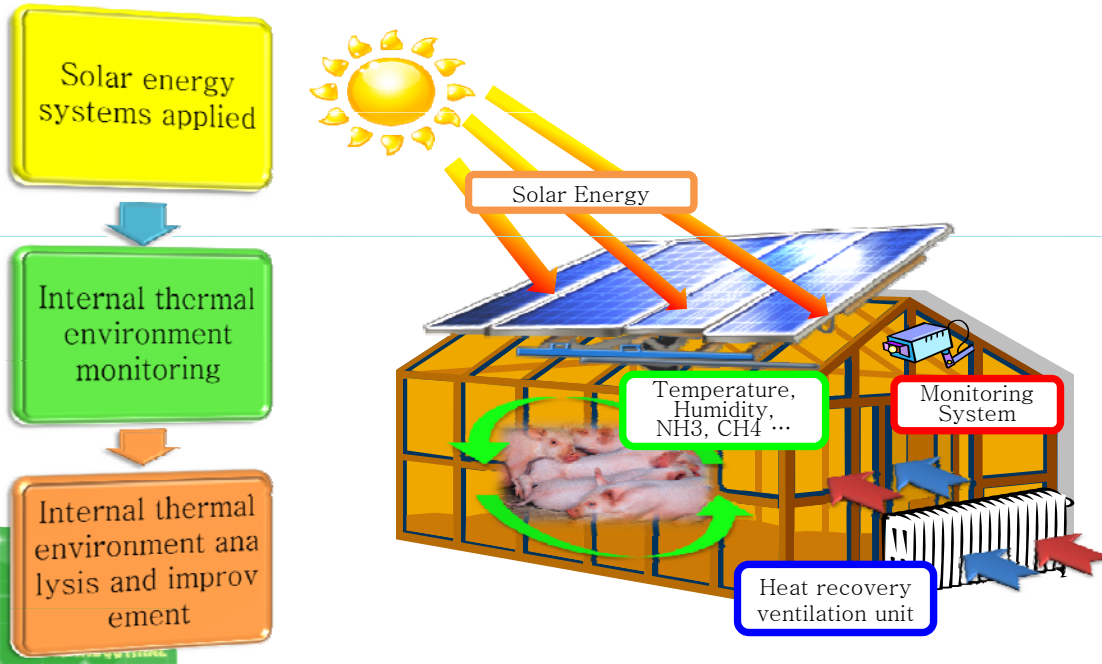
Facility Environment Bio-Systems Lab. : F.E.B.S. Lab.

## Windowless swine



- ❖ Development of air-circulating solar heating system using **Windowless swine wall**
- ❖ Environmental control system development of **Energy-saving** using renewable energy

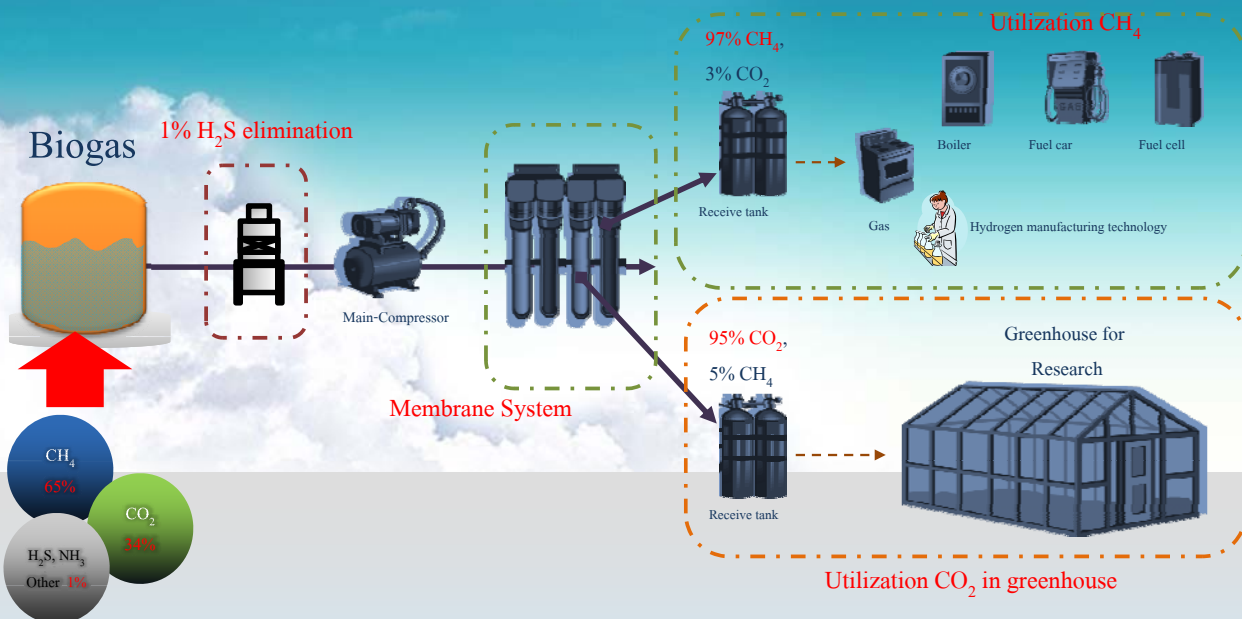
# Heat recovery unit



❖ Analysis and improvement of livestock environment in accordance with the applying Energy Recovery Ventilator(ERV)

Facility Environment Bio-Systems Lab. : F.E.B.S.

# Development innovation of membrane utilization for Biomass production in livestock



➤ Study to develop the efficiency membrane technology with gas separations, and directly apply CO<sub>2</sub> gases in a greenhouse with plant growths.

Facility Environment Bio-Systems Lab. : F.E.B.S. Lab.

# Poultry litter/Manure management

- To Control of Ammonia and Carbon dioxide from poultry litter
- To Reduce Nitrogen loss and Phosphorus runoff

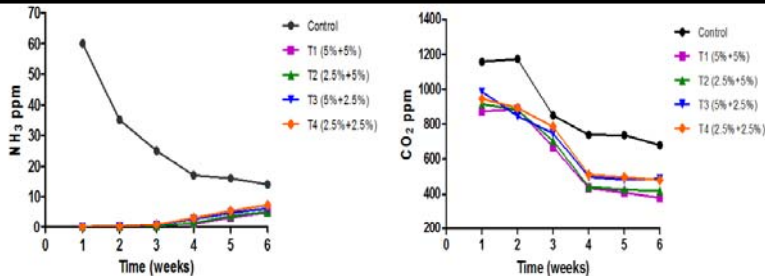
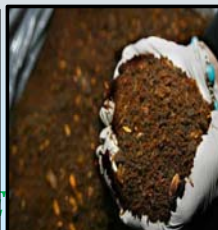
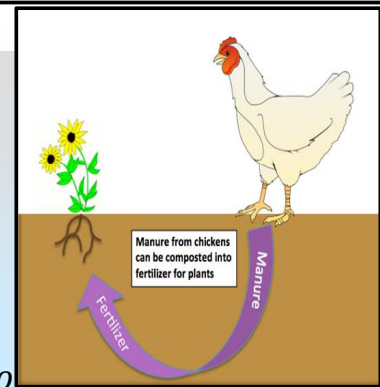


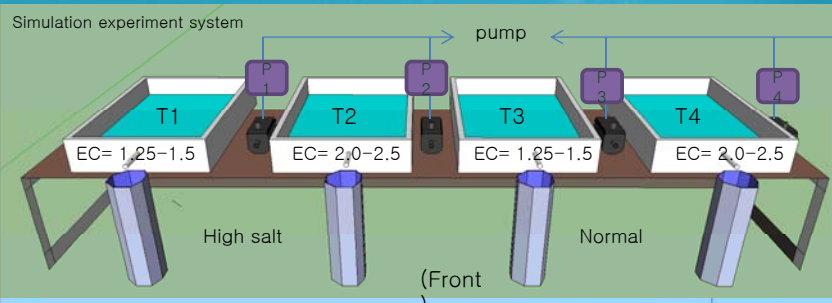
Fig 1. Average NH<sub>3</sub> and CO<sub>2</sub> emission above poultry litter during six weeks after applying blend of Aluminum Sulfate and Ferric Chloride at various concentrations.



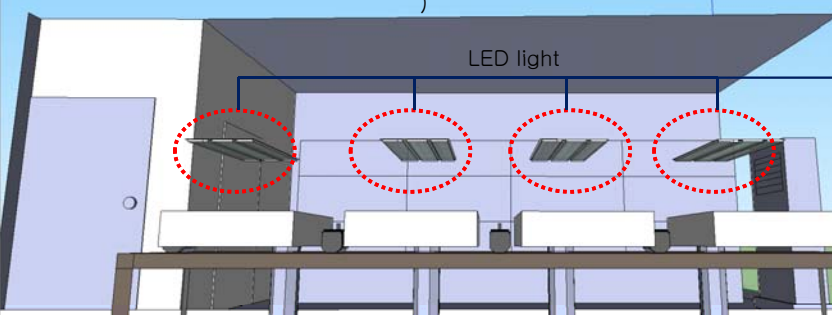
# Plant+ICT



# Analysis of ice plant growth by solution components.



Timer  
08.30-02.00  
Every 30 min. at 3 min.



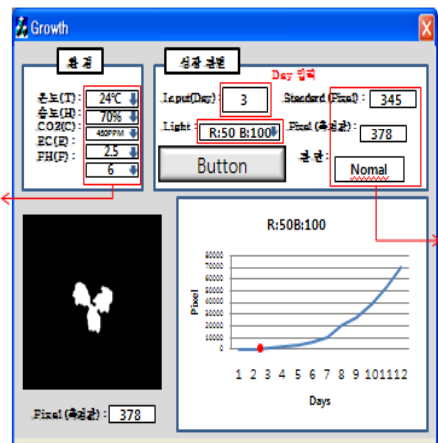
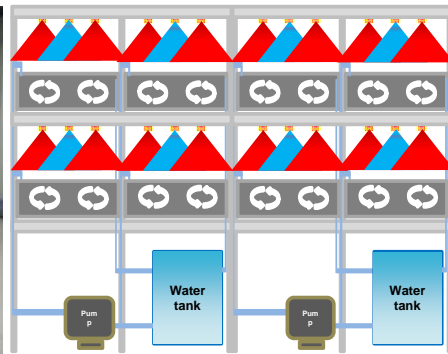
Timer  
6.00am-9.00 pm



➤ Growth of ice plant according to nutrient composition ratio

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## Plant factory



Early Detecting



$$Y = ax^2 + bx + c$$

X = Day, Y = StandardPixel  
∴ [a, b, c] 값이 중요

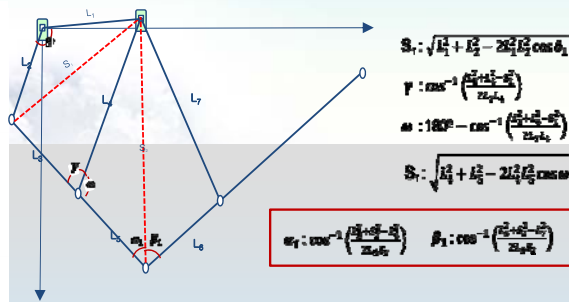
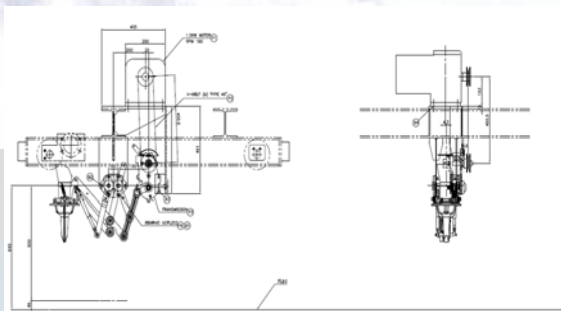
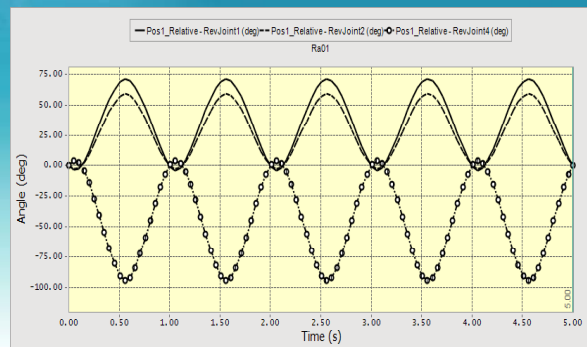
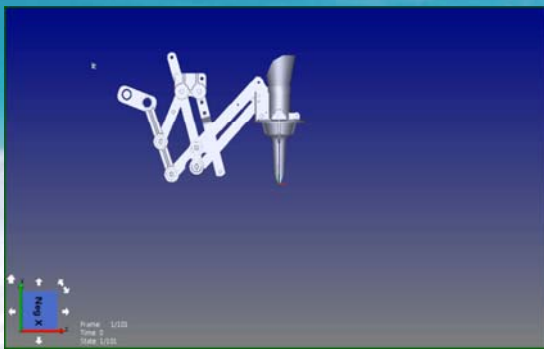
- ❖ Image processing system for crop's growth estimation in the plant factory
- ❖ Anthocyanin estimation of lettuce according to LED light combinations
- ❖ Estimated photosynthesis of lettuce by CO<sub>2</sub> consumption calculating
- ❖ Algorithm Development of Diagnosis pathogenic bacteria in plant factory



# Agro.+Systems

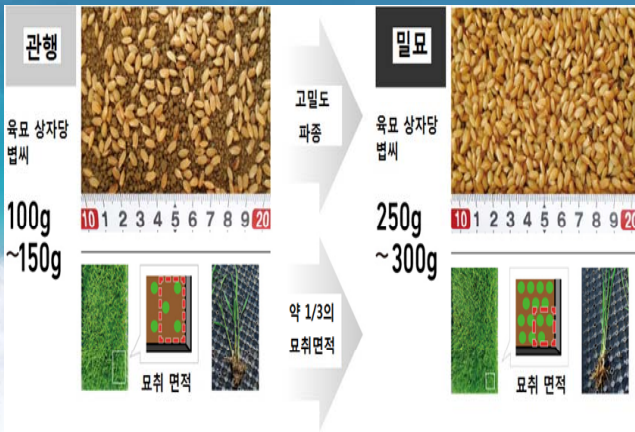
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## Vegetable transplanting machine



- Study on Optimal Performance Implementation through Structural Analysis of planting device

Facility Environment Bio-Systems Lab. : F.E.B.S. Lab.



### Performance content of main reserch

- Simulation model development of planting arm trajectory
- Simulation model verification evaluation of planting arm trajectory
- cultivation techniques founding of close planting young rice

### Performance method of main reserch

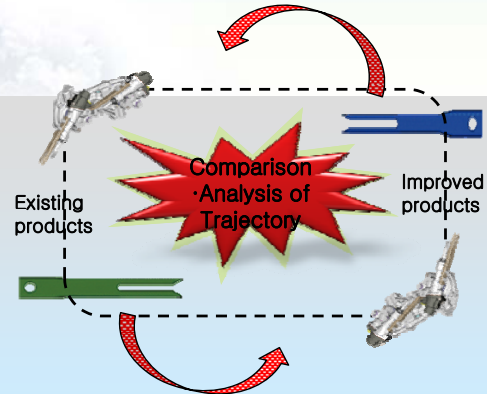
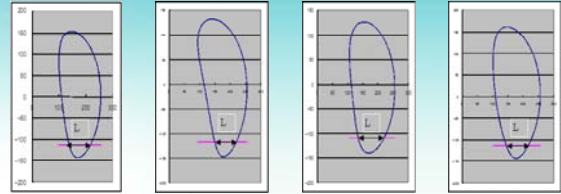
- interpretation & analysis by using the multibody dynamics program
- qualitative evaluation & field test
- domestic and foreign literature investigation & practice farming technique organization

### Trajectory Analysis of Domestic·Foreign Rice Transplanter Planting (Recurdyn program)

- Form Analysis of Domestic· Foreign Rice Transplanter Planting
- Affect Understanding of Factor Affecting To The Trajectory

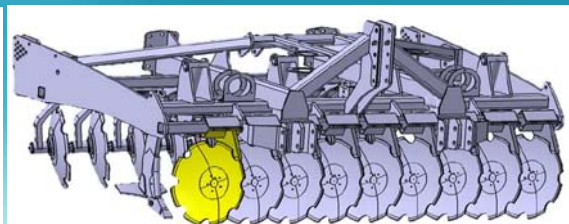
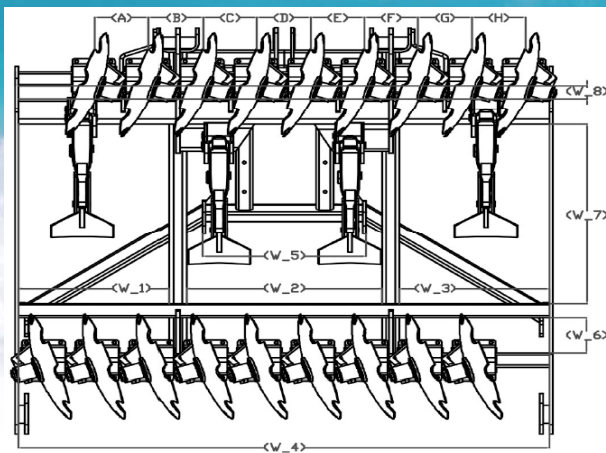
### Trajectory Simulation & Intensive Culture Techique Establishment

- Trajectory Analysis of Rice Transplanter Main Device By Using The High Speed Camera
- Optium Planting Trajectory Miss-Planted Rate, Competitiveness and So on

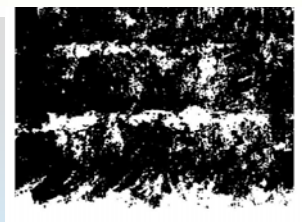


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## Working machine (Disk harrow)



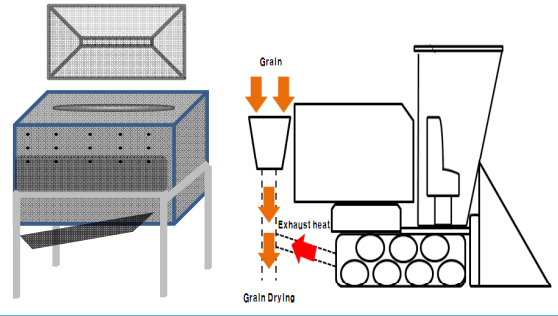
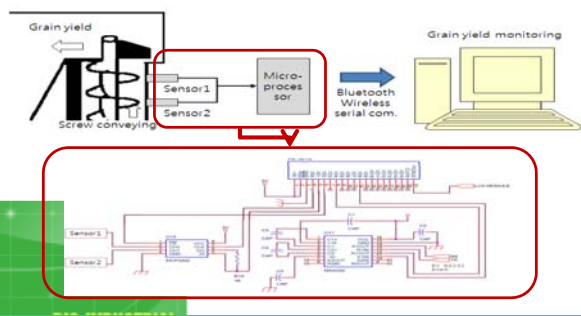
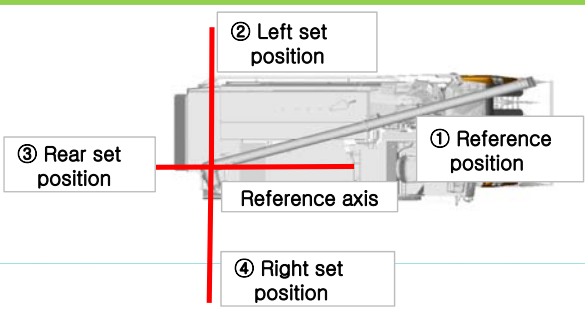
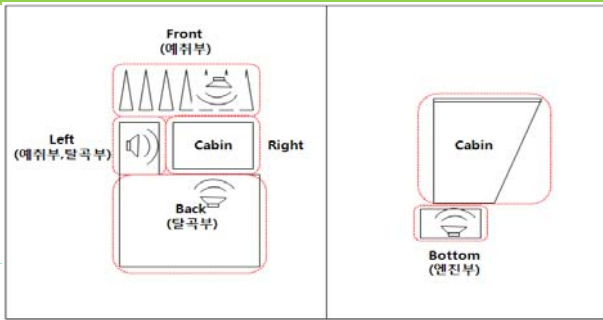
Classification	Independent Variable	Value		
Expt. 1	Moisture Content	14%	24%	29%
Expt. 2	Working Speed	0.2 m/s	0.4 m/s	0.6 m/s
Expt. 3	Unit Weight	2.3 over / 1000 kg/m <sup>2</sup>		
Expt. 4	The spacing of disk	20cm	40cm	



- Analysis of tillage operation according to properties of soil & work machine

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# Six row COMBINE



- ❖ Development of high efficiency 6 Row combine harvest equipped with IT convergence
- ❖ Improve the performance of Combine the main part(Feed rate, harvest monitoring)

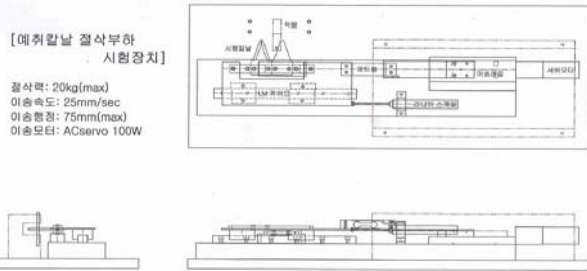
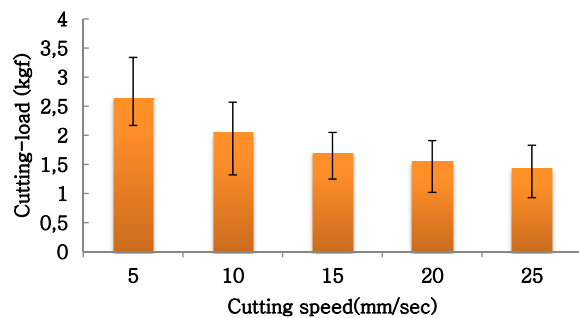
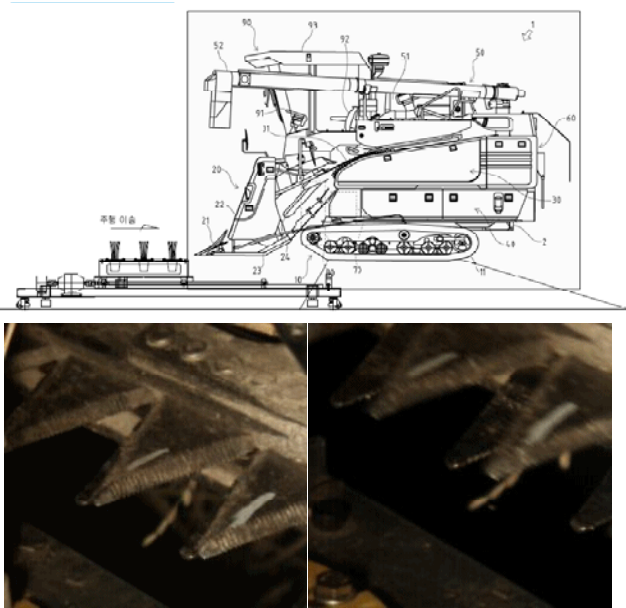


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# RESEARCH III of Plants(Rice)

## Combine cutting knife performance evaluation



- ❖ Cutting performance evaluation of crops using a high-speed camera
- ❖ Measurement of cutting load along the cutting knife and cutting speed



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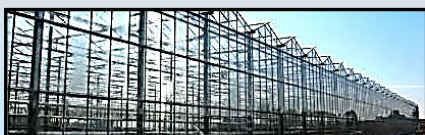




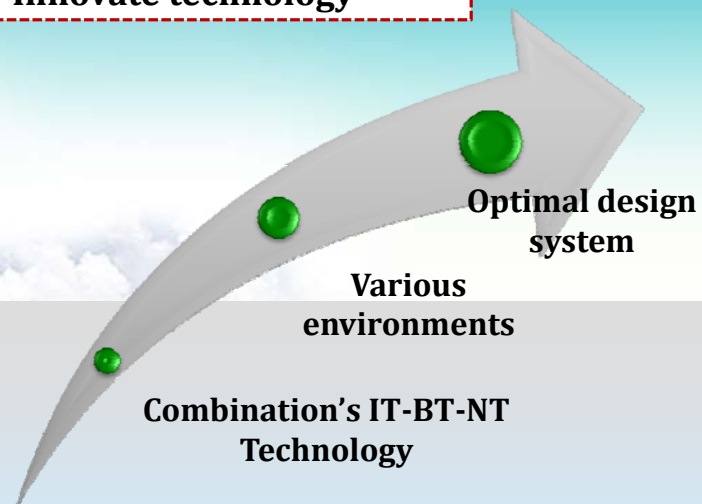
# *Promoting Task for Activation Of FEBS in GNU*

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## **Planning in the Future**



**Chamber-Automatic control system  
&  
New Innovate technology**



*Facility Environment Bio-Systems Lab. : F.E.B.S. Lab.*



# *Thank you!*

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<http://febs.gnu.ac.kr>

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*Facility Environment Bio-Systems Lab. : F.E.B.S. Lab.*