講者簡介

Mr. Kohji Nakasaka (Japan)
Sub-manager,
Smart Agriculture Industry Department,
OPTiM corporation

OPTiM 公司成立於 2000 年，為一 IT 服務公司，提供各類服務，如：物聯網（IoT）平臺、遠端管理等獨特服務。其中農業為目前關注產業之一，已開發出「精準農藥噴灑技術」（Pin-point Pesticide Spraying Technology）的新型 AI 系統，能利用無人機所拍攝的照片，找出受到病蟲害的熱點，此外還能運用無人機將農藥精準施用於需要施藥位置。

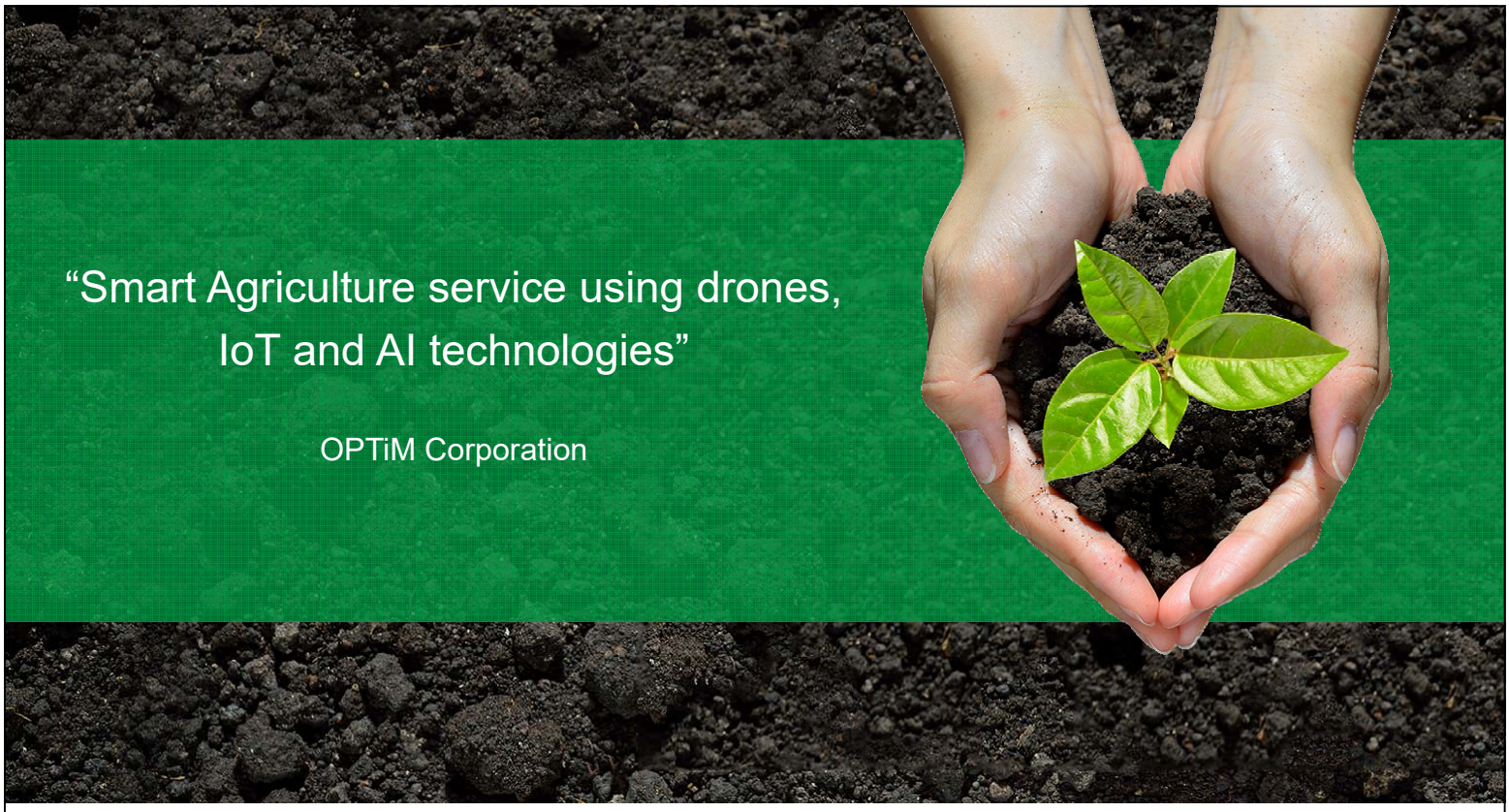
OPTiM corporation is an IT service company founded in 2000. We provide a variety of services such as IoT Platform, Remote Management, and other unique services. Agriculture is one of the industries we are focusing on these days. We've developed a new AI system called "Pin-point Pesticide Spraying Technology" that can detect hotspots damaged by pests and diseases via pictures taken by drone. Also, drone can apply pesticides on the spots that only should be applied.

QUALIFICATIONS

- Hokkaido University, Bachelor of Agriculture
- Wageningen University, Master of Organic Agriculture

PROFESSIONAL EXPERIENCE

- Sojitz corporation, Accountant/Controller
- Organic Farm in Tochigi (Japan), Agriculture Worker
- International Institution of Tropical Agriculture (IITA), Tamale (Ghana), Intern



“Smart Agriculture service using drones, IoT and AI technologies”

OPTiM Corporation

OPTIM

Company Outline

Corporation	OPTiM Corporation (Tokyo Stock Exchange, First Division: 3694)
Locations	Saga Office: OPTiM Headquarters Building, 1 Honjo-machi, Saga Tokyo Head Office: Shiodome Building 21F, 1-2-20 Kaigan, Minato-ku, Tokyo Kyukodai-mae Office: 680-41 Center of Iizuka Research & Development 103, Kawazu, Iizuka-shi, Fukuoka Silicon Valley Office：Metro Plaza – 101, North San Jose, San Jose, CA
President	Shunji Sugaya
Date of Establishment	June 8th, 2000
Capital stock	411,356,000 Yen
Fiscal year-end	March
Employees	450（including contract and part-time staff） 80 percent of OPTiM staffs are system engineers Average staff age: 33.3
Major stockholders	Shunji Sugaya, NIPPON TELEGRAPH AND TELEPHONE EAST CORPORATION, Fuji Xerox Co., Ltd.
Main business	License sales and maintenance support services -- i.e. Optimal business solutions (IoT Platform Services/Remote Management services/Support services, etc.)

Saga Office

Tokyo Head Office

OPTIM

使用無人機、物聯網和人工智慧技術的智慧農業服務

OPTiM Corporation

公司概況

公司	OPTiM Corporation（東京證券交易所，第一部門：3694)
地點	佐賀辦事處：佐賀市本莊町1號OPTiM總部大樓 東京總公司：汐留大廈東京都港區海岸1-2-20號21樓 Kyukodai-mae 辦公室：福岡市飯塚市河津市飯塚研究開發機構680-41 矽谷辦公室：Metro Plaza – 101, North San Jose, San Jose, CA
董事長	Shunji Sugaya
成立日	2000年6月8號
資本額	411,356,000 日圓
財政年度結束	三月
員工	450人（包括約聘和兼職人員） 80%OPTiM員工都是系統工程師 平均員工年齡：33.3歲
主要股東	Shunji Sugaya, NTT EAST（NIPPON TELEGRAPH AND TELEPHONE EAST CORPORATION）, 台灣富士全錄（Fuji Xerox Co., Ltd.）
主要業務	許可證銷售和維護支援服務 - 即最佳業務解決方案 （物聯網平台服務/遠程管理服務/支援服務等）

佐賀辦公室

東京總公司

OPTiM Headquarters

OPTiM Headquarters Building

OPTiM Cafe 1F

OPTiM AI・IoT・Robot Pavilion 3F

OPTiM Robotics Laboratory

Accelerating collaborative research with Saga University to develop next-generation technology

OPTIM

OPTiM's Values

To OPTiM,
"Intellectual property is the fruit of innovation"

Rank(previous)	Company name	Patent asset volume (pts)	Registered patents
1 (1)	NTT	39,154	1,662
2 (2)	NTT docomo	24,056	803
3 (3)	MICROSOFT	20,847	755
4 (12)	YAHOO	12,733	312
5 (4)	ERICSSON	10,866	370
6 (5)	NHK	6,385	360
7 (7)	KDDI	5,299	391
8 (8)	Nomura Research Institute	4,503	144
9 (34)	**OPTiM**	**2,345**	**19**
10 (15)	FRANCE TELECOM	1,945	72

Our founder/CEO recognized as **the #1 individual** in the ranking of "Patent Asset Scale among Japanese in the Information Communication Industry between 1993 and 2015"

	Inventor	Time from first patent application (years)	Inventor score (proportional)	Valid patents	All patents	First patent registration date	Last patent registration date	Average number of inventors	Company type
	Shunji Sugaya	-13.86	306.8	119	119	2001/03/23	2013/09/12	0.050	OPTiM
2	Y.M	-15.50	273.3	166	166	1999/08/03	2013/03/22	0.205	Major IT company
3	M.S	-19.83	244.3	336	336	1995/04/03	2010/01/07	2.521	Major communications carrier
4	K.H	-19.11	194.6	280	280	1995/12/22	2013/02/19	2.579	Major communications carrier
5	Y.K	-9.80	185.2	298	298	2005/04/13	2013/06/28	2.557	Major communications carrier

as of Jan. 2015

Device management technology (IoT field) for smartphones Comprehensive Patent Power **TOP10**

Rank	Company	Comprehensive power (rights holder score)	Valid patents	Individual power (top score)
1	Panasonic	612.0	86	78.8
2	Sharp	275.2	120	72.7
3	**OPTiM**	**271.1**	**30**	**72.9**
4	Mitsubishi Electric	186.4	26	72.5
5	Toshiba	166.2	32	79.3

3rd Place in "Comprehensive Patent Rankings for Electronic Device Management"(2014)

OPTIM

OPTiM總部

Welcome to OPTiM® Innovation Park
2017.10.20 START!!
@SAGA UNIVERSITY HONJO CAMPUS

OPTiM Headquarters Building

OPTiM Cafe 1F

OPTiM AI・IoT・Robot Pavilion 3F

OPTiM Robotics Laboratory

加速與佐賀大學的合作研究，開發下一代技術

OPTiM的價值

對 OPTiM而言，
「智慧財產權是創新的成果」

Rank(previous)	Company name	Patent asset volume (pts)	Registered patents
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OPTiM創辦人/執行長被公認為「1993年至2015年間日本訊息通訊業專利資產規模」排名第一的個人

	Inventor	Time from first patent application (years)	Inventor score (proportional)	Valid patents	All patents	First patent registration date	Last patent registration date	Average number of inventors	Company type
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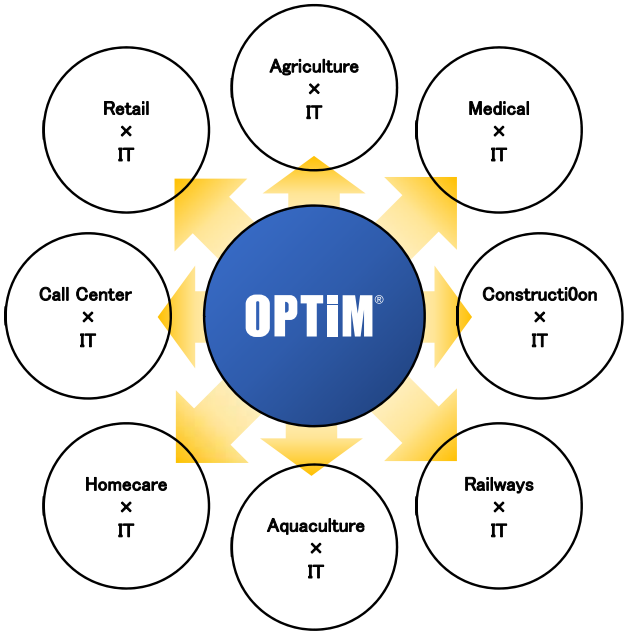
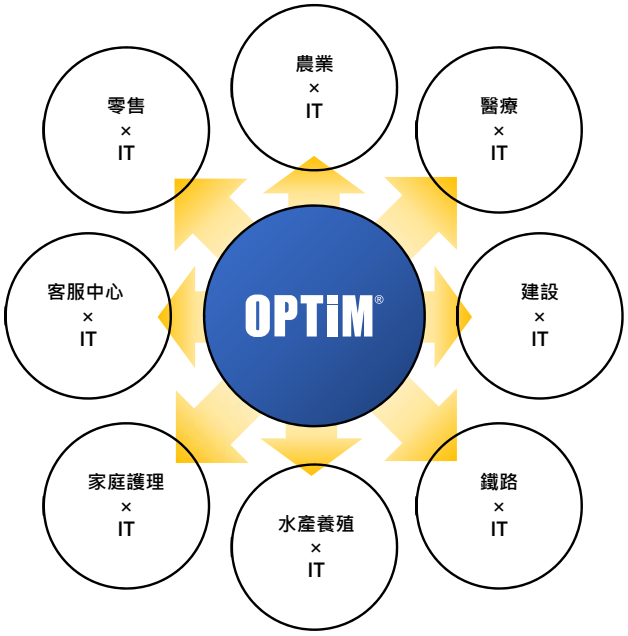
「電子設備管理綜合專利排名」第3名（2014年）



OPTiM's Strategy 「○○×IT」

We strive to approach to the 4th Industrial Revolution era with「○○×IT」projects, combining our AI, IoT and robotics with every industry



OPTiM的策略
「○○×IT」

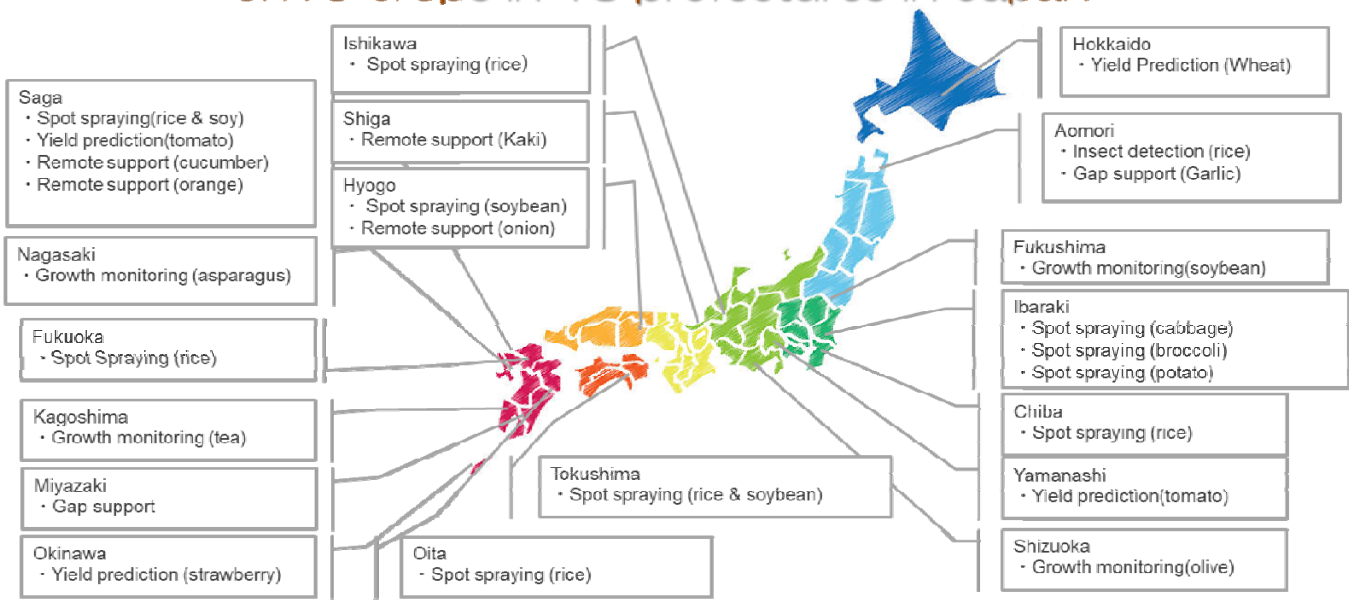
我們努力透過各種「○○×IT」計畫進入第四次工業革命，將我們的人工智慧、物聯網和機器人技術與各個行業結合

Mission Statement for Agriculture

To make the agriculture more enjoyable, appealing and profitable by utilizing AI, IoT and Robotics.

Smart Agriculture Project in Japan

We have been applying our smart agriculture solutions on18 crops in 18 prefectures in Japan

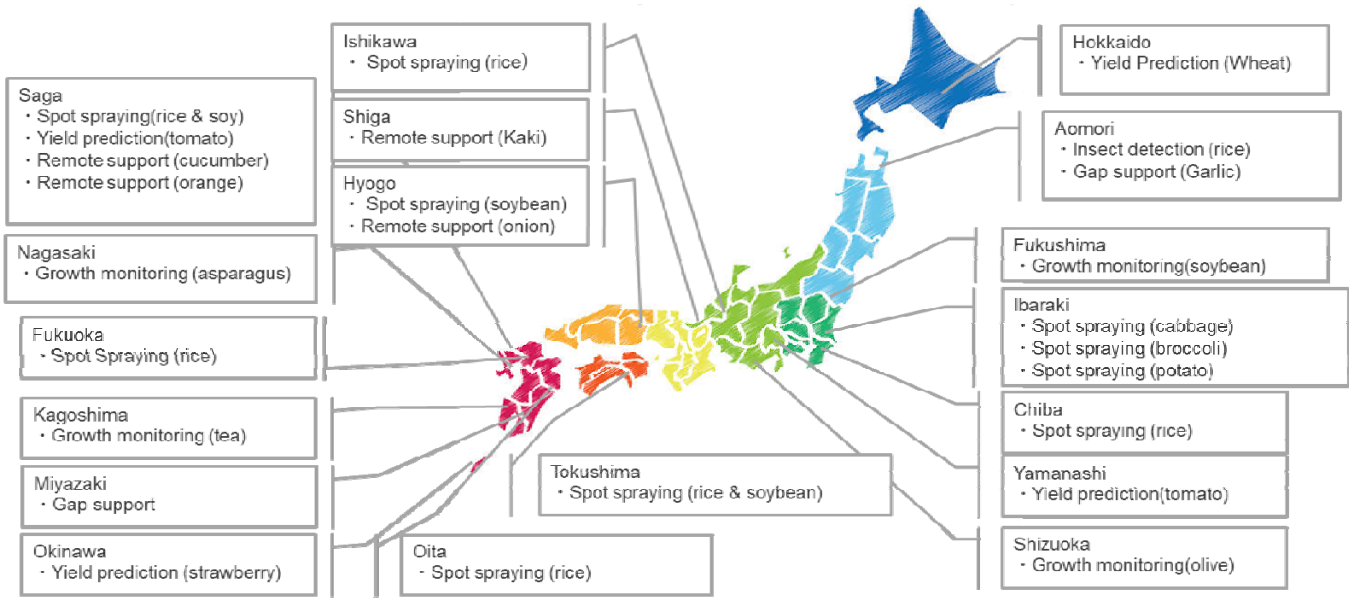


農業使命宣言

人工智慧，物聯網和機器人技術，使農業更有樂趣、吸引人並且有利可圖。

日本智慧農業計畫

我們已在日本18個省份18種作物上應用我們的智慧農業解決方案



Drone Spot Spraying Technology (Pin-point spraying of pesticide application)

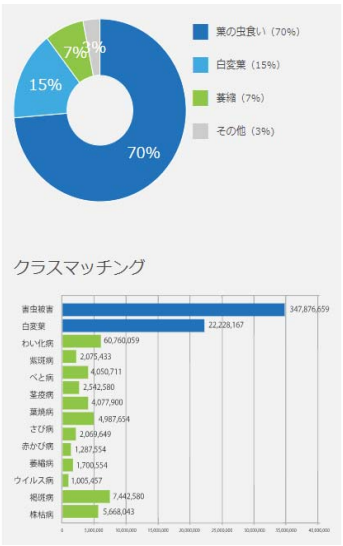
AI can detect the damage from pests and diseases via pictures taken by drone

➡Our technology can prevent insect damage in the early stage.

推測結果

推測分類

クラス推測 ： 吉虫被害、ハスモンヨトウ、白変葉



Smart Agri Project - Smart Soybeans Cultivation -

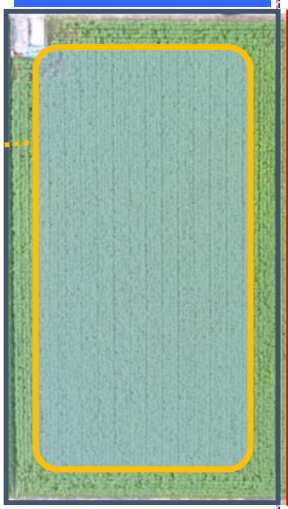
Normal Cultivation (controlled field)

Spay fertilizers and pesticides to the whole soybean field

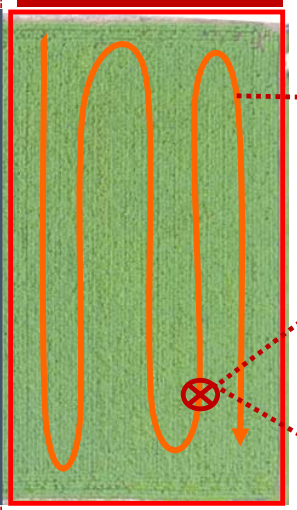
Observed factors:

- Reduction of residual pesticide amount
- Pesticide cost
- Yield
- Quality
- Labor cost

Normal Field



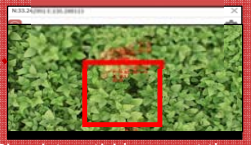
SmartAgri Field



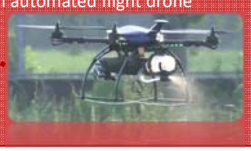
Drone Spot Spraying Technology

1. Capture field whole image with automated flight drone

2. Locate pest affected spot with AI image analysis



3. Pinpoint pesticide spray at the spot with automated flight drone



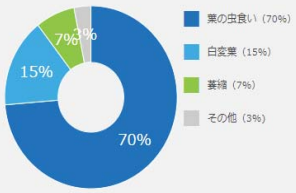
無人機定點噴灑技術（精準噴灑農藥應用）

人工智慧可透過無人機拍攝的照片檢測出病蟲害
➡我們的技術可早期防止病蟲害。

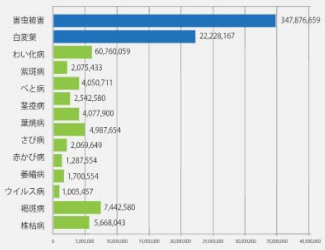
推測結果

推測分類

クラス推測 ： 吉虫被害、ハスモンヨトウ、白変葉



クラスマッチング



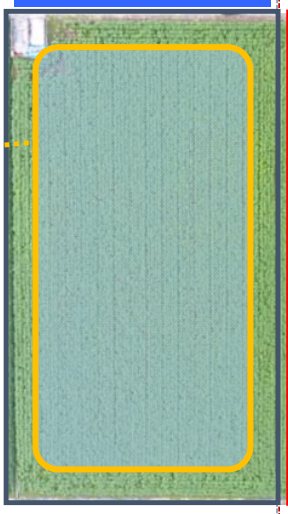
智慧農業計畫 - 智慧大豆栽種 -

正常栽培（對照組田地）

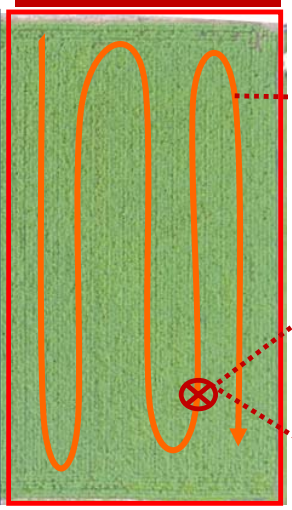
整個大豆田都噴灑肥料和農藥

觀察因子：
- 農藥殘留減少
- 農藥成本
- 產量
- 品質
- 勞動力成本

正常田地



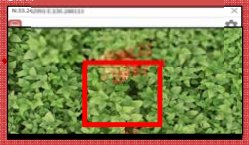
智慧農業田地



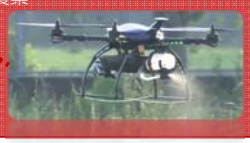
無人機定點噴灑技術

1.使用自動飛行無人機拍攝田地全圖像

2.透過AI圖像分析找到有害生物影響的點



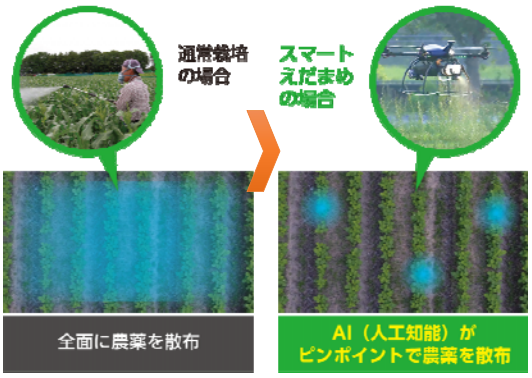
3.使用自動飛行無人機精準定點噴灑農藥



The Benefits of Drone Spot Spraying Technology

Drone Spot Spraying Technology Can Make Safe and High Value-Added Agricultural Products

Drone Spot Spraying Technology



Result of residual pesticide test (Soy Bean)

※出典：2017年10月19日（佐賀大学農学部 渡邉啓一氏 監修（実施：株式会社ブルーム）●検査方法：同一品種（黒豆大豆：クロダマル）を、同一農家（イケマコ）にて栽培。●隣接する場所に、通常農薬散布の圃場とピンポイント農薬散布の圃場（各44aの面積）を構築。●2017年9月に農薬散布を実施し、2017年10月に5箇所からサンプルを採取。サンプル場所は両圃場から一定の距離を保つように配慮し、5箇所のサンプルを混ぜて残留農薬を検査。

＊1 減農薬基準：慣行栽培と比較した場合の削減量
＊2 エトフェンプロックスの場合。他も同様に不検出となります。

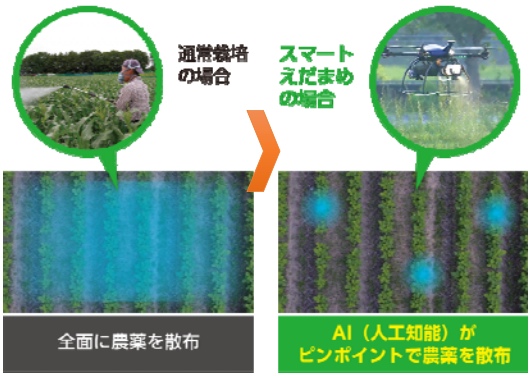
Pesticide use

Reduced 90% pesticide use!

無人機定點噴灑技術的好處

無人機定點噴灑技術可產出安全、高附加值的農產品

無人機定點噴灑技術



殘留農藥試驗結果（大豆）

＊減農薬基準：慣行栽培と比較した場合の削減量

※出典：2017年10月19日（佐賀大学農学部 渡邉啓一氏 監修（実施：株式会社ブルーム）●検査方法：同一品種（黒豆大豆：クロダマル）を、同一農家（イケマコ）にて栽培・●隣接する場所に、通常農薬散布の圃場とピンポイント農薬散布の圃場（各44aの面積）を構築・●2017年9月に農薬散布を実施し、2017年10月に5箇所からサンプルを採取・サンプル場所は両圃場から一定の距離を保つように配慮し、5箇所のサンプルを混ぜて残留農薬を検査・

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＊2　エトフェンプロックスの場合・他も同様に不検出となります・

OPTiM

農藥使用

減少90%的農藥使用！

OPTiM

Yield and Quality

Yield and quality (crop shape etc.) are retained at the same level as controlled field

Result of residual pesticide test

Unit : ppm

Name of crops	TYPE	etofenprox	chlorantraniliprole	teflubenzuron	dinotefuran	quizalofop ethyl
Edamame	Reference value at simultaneous spraying	3	1	1	2	0. 3
Edamame	Results when using a pinpoint pesticide spraying	No detected (<0. 01)	No detected (<0. 01)	No detected (<0. 01)	No detected (<0. 01)	No detected (<0. 01)

BLOOM
People Who are Interested to Import Cosmetic into Japan

As of 19 OCT 2017

產量和質量

產量和品質（作物形狀等）
與對照組田地維持同一水平

殘留農藥試驗結果

單位：ppm

農作物名稱	類型	依芬寧	剋安勃	得福隆	達特南	快伏草
毛豆	同時噴灑時的參考值	3	1	1	2	0.3
毛豆	使用精準農藥噴灑的結果	未檢出（＜0.01）	未檢出（＜0.01）	未檢出（＜0.01）	未檢出（＜0.01）	未檢出（＜0.01）

BLOOM
People Who are Interested to Import Cosmetic into Japan

2017年10月19日

Smart soybean (EDAMAME) project：

Smart soybean sold at Fukuoka Mitsukoshi

Data at Fukuoka Mitsukoshi

	Smart Soybeans	Normal Soybeans
Soy Bean price per 100 g	２００yen	６７yen

Sold at about 3 times price

The price is set based on famous brand price range such as Tanba’ s Black Beans in Japan

智慧大豆（毛豆）計畫：

在福岡三越販賣的智慧毛豆

福岡三越的數據

	智慧毛豆	普通毛豆
每100克大豆價格	200日圓	67日圓

售價約3倍

價格是根據知名品牌價格的範圍設定，如日本的Tanba黑豆

Sold beans at Department Store Mitsukoshi Fukuoka

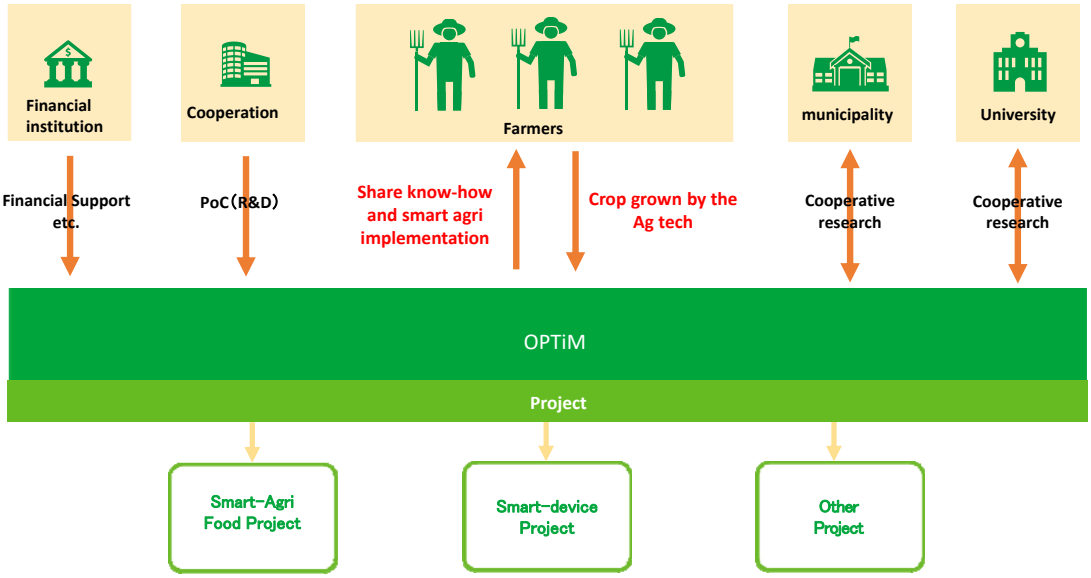
27th October 2017
Sold Beans at Department Store Mitsukoshi Fukuoka

SOLD OUT

FUKUOKA

Smart Agriculture Alliance

Sharing the updated OPTiM technologies including drone spot spraying with the future oriented farmers who are willing to apply the tech to their practices



在福岡三越百貨公司販售的毛豆

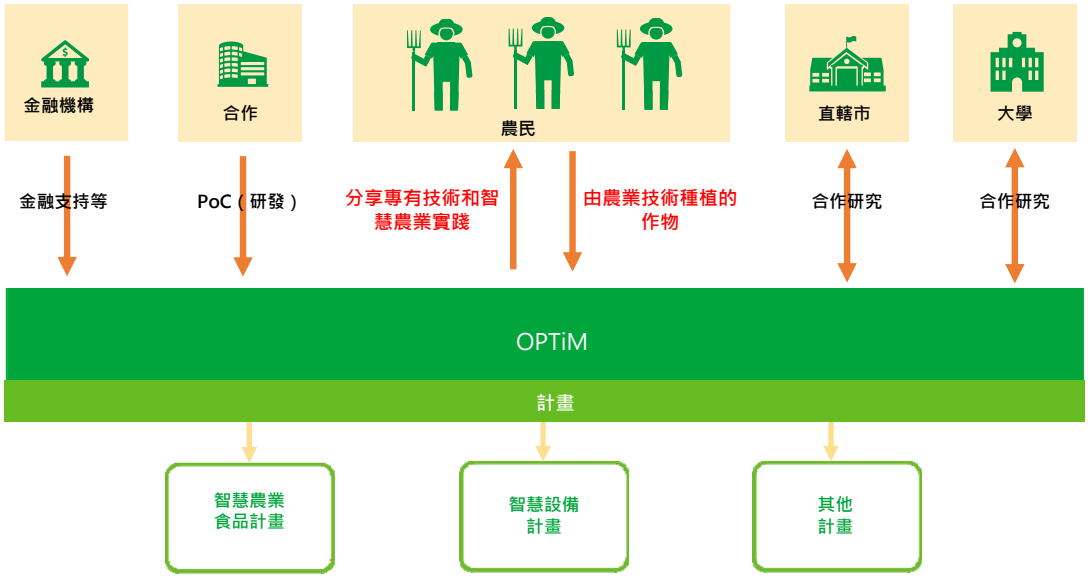
2017年10月27日
在百貨公司賣的毛豆
福岡三越百貨公司

SOLD OUT

FUKUOKA

智慧農業聯盟

分享更新的OPTiM技術，包括無人機定點噴灑
與未來導向、願意將技術應用於耕作的農民



We are offering

Pin-point Pesticide Spraying Technology and Smart Agriculture Solution

to farmer across Japan

with free of charge !!

We will purchase **a total amount of harvest** produced with **Pin-point Pesticide Spraying Technology and Smart Agriculture Solution**

我們免費提供

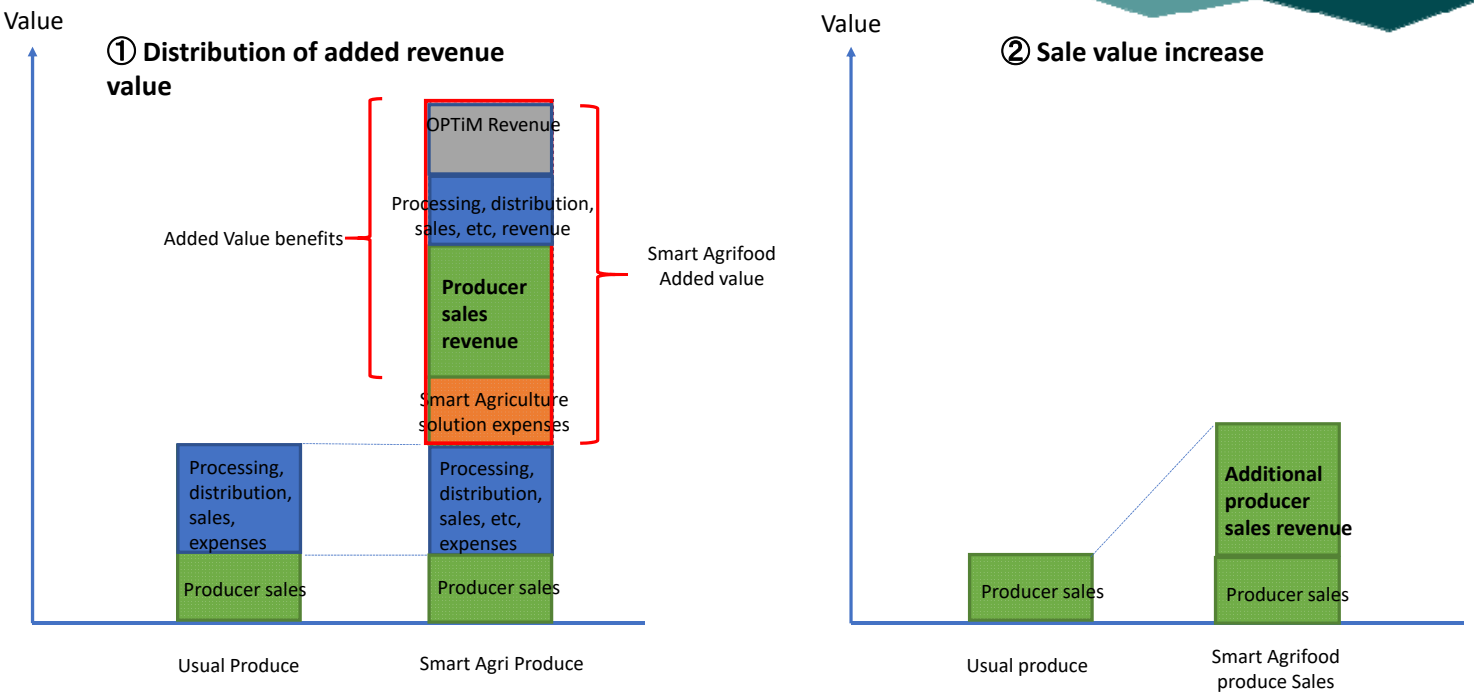
日本各地的農民

精準農藥噴灑技術與智慧農業解決方案

!!

我們將收構所有採用精準農藥噴灑技術和智慧農業解決方案生產的農產品。

“Smart AgriFood Project” and Business model



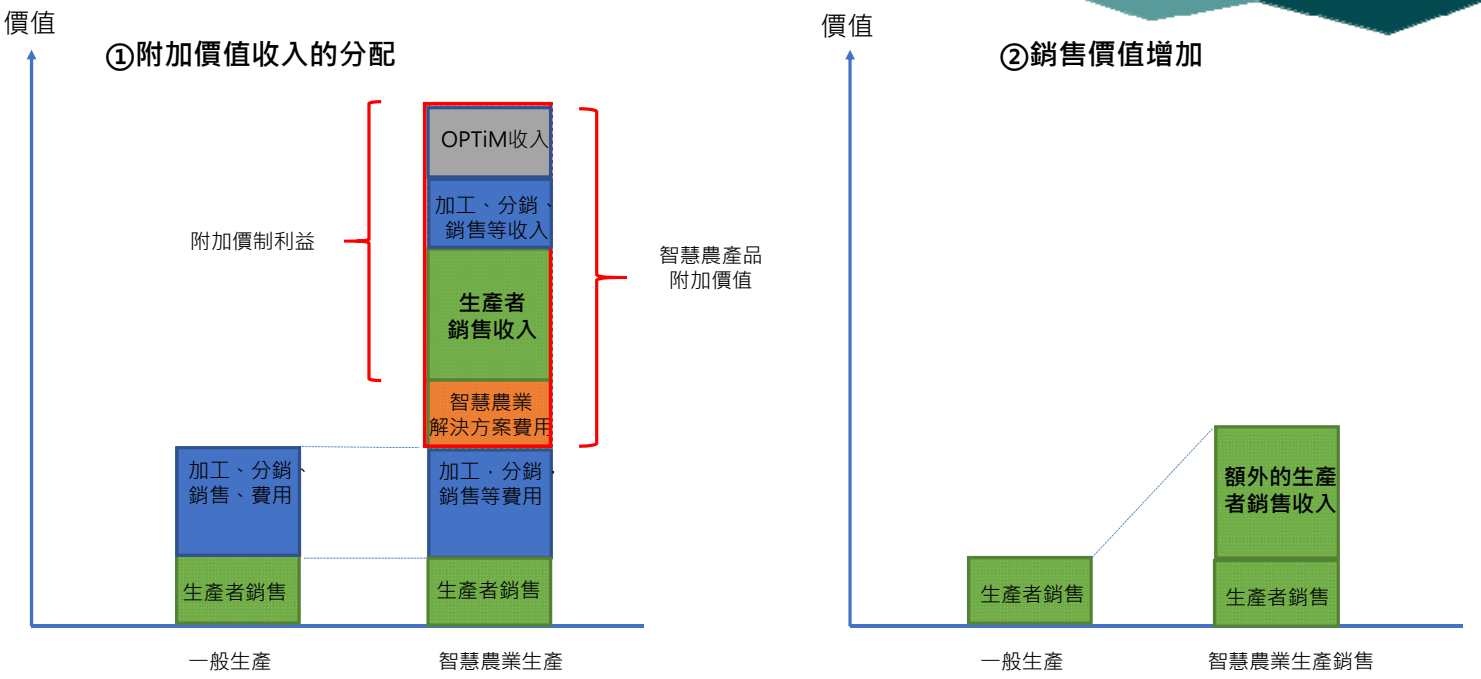
“0” risk to utilize smart agriculture

(Reduction of labor for pesticide application, cost of pesticide, health risk by pesticides)

“0” risk to waste products by smart agriculture

“∞” potential to yield more profit

「智慧農業食品計畫」和商業模式



智慧農業「0」風險

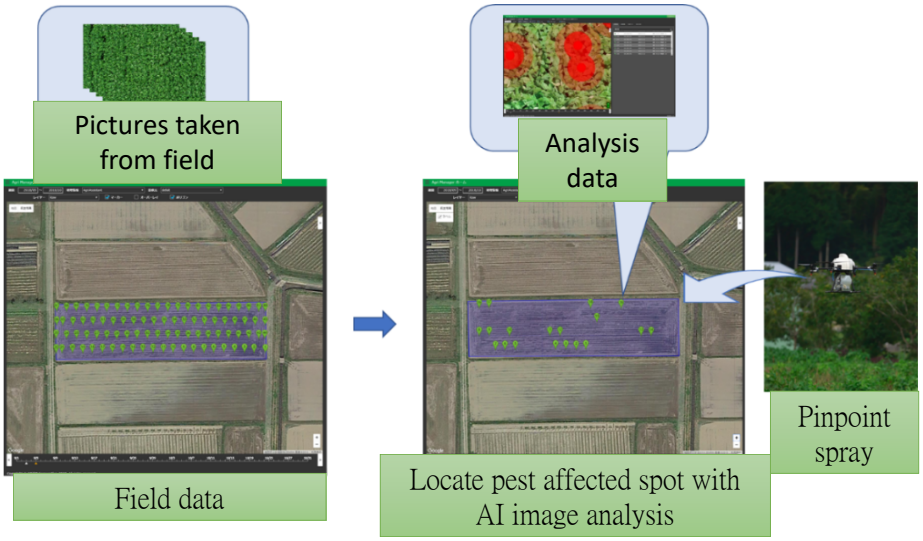
（減少使用農藥所需的勞動力、農藥成本，以及農藥造成的健康風險）

智慧農業廢棄物「0」風險

「∞」潛力產生更多利潤

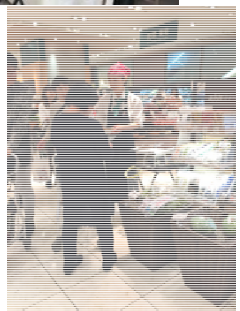
We succeeded in using Pin-point spray technology for pesticide application in black soybean field

Reduced 99% pesticide use!
Saved 30% amount of effort!



Sold beans at Department Store Takashimaya Tokyo and vegetable stores

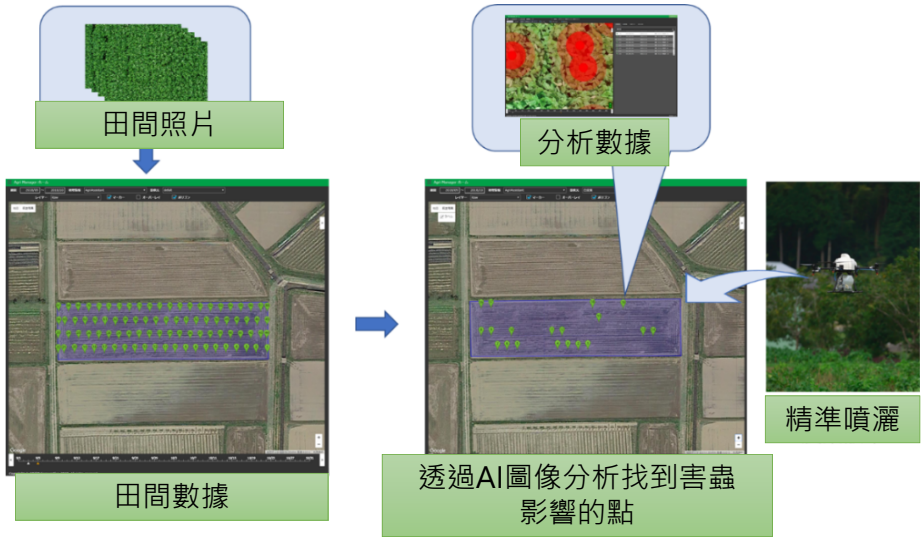
Takashimaya



八彩 YASAI

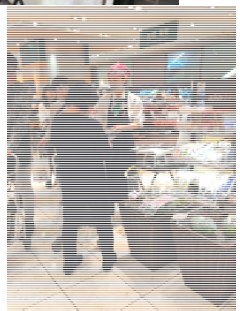
我們成功地將定點噴灑技術用於黑豆田的農藥施用

減少99%的農藥使用！
節省了30%的勞動力！



賣到東京高島屋和蔬菜商店的大豆

Takashimaya



八彩 YASAI

NEW release! “Smart Rise”

Up to Reduced 100% pesticide use!

スマート米

“AI”や“ドローン”を使った
“新しい栽培方法”

特許番号：第 6326009 号

スマート米の売上の一部は、AIやドローンを活用した
新しい栽培方法にチャレンジする生産者に還元されます。

Smart-Agri Project
Plan for next step by crops and scale

	2018	2019	2020
Rice Soybean	Start to conduct application in some areas and selling smart-agri products	Expanding application in all areas in Japan	Exporting to overseas
Potato Broccoli Cabbage And more	Conducted testing Pinpoint spray technology in test fields Started to test selling agricultural products	Expanding application in all areas in Japan	Exporting to overseas

新發布！「智慧崛起」

最多可減少100%的農藥使用！

スマート米

“AI”や“ドローン”を使った
“新しい栽培方法”

特許番号：第 6326009 号

スマート米の売上の一部は、AIやドローンを活用した
新しい栽培方法にチャレンジする生産者に還元されます。

智慧農業計畫

	2018年	2019年	2020年
稻米	開始在某些領域開展應用，並銷售智慧農產品	擴大在日本各地的應用	出口到海外
大豆			
馬鈴薯	在測試田進行精準噴灑技術測試 開始測試銷售農產品	擴大在日本各地的應用	出口到海外
綠花椰菜			
高麗菜			
更多作物			

We are trying to make the best use of reducing the amount of pesticide.

In the future, **Pinpoint pesticide spray technology** will become a mainstream method of agriculture all over the world

Intellectual Property Strategy

Our Pin-point spraying of pesticide application related technologies has acquisitioned the basic patent group in Japan and the US.

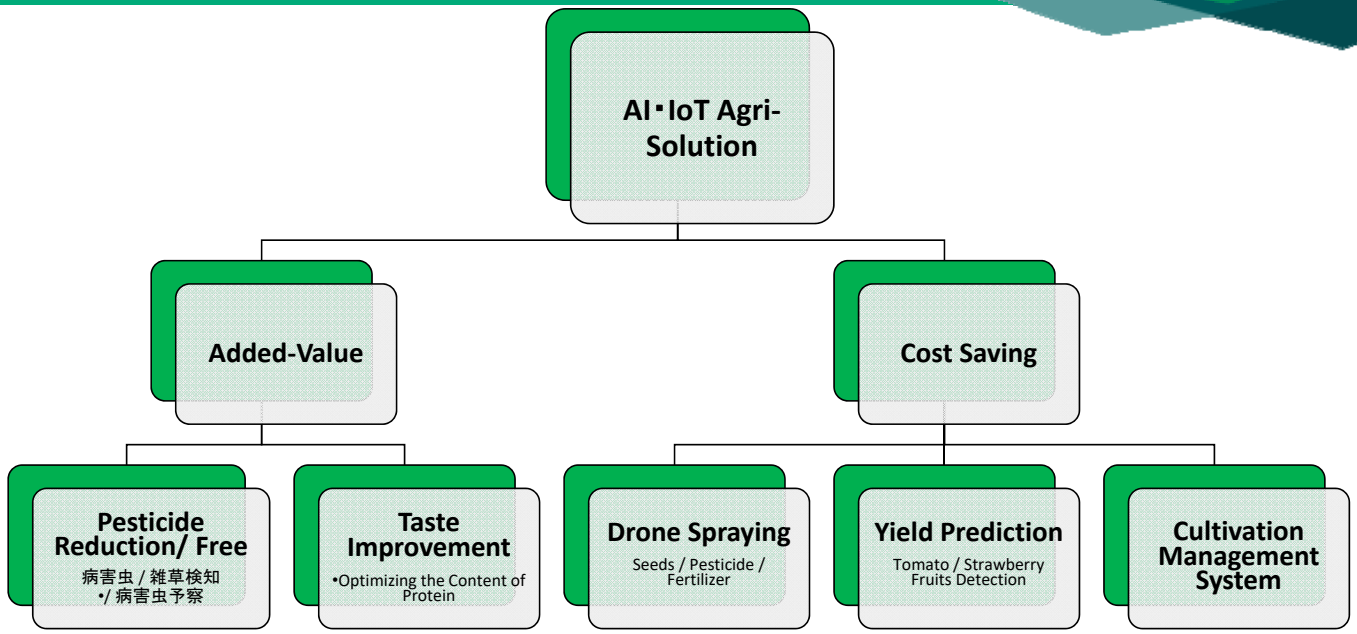
Patent number 6326009

我們正在努力減少農藥用量

定點農藥噴灑技術將成為未來全世界農業的主流方法

我們已收構日本和美國與農藥應用相關的定點噴灑技術專利號6326009

AI・IoT Agri-Solution

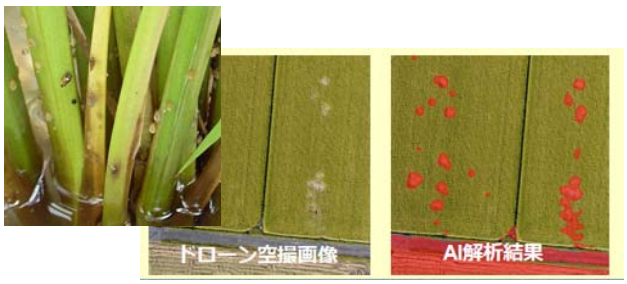


AI / IoT Agri-Solution Gives an Edge to be Competitive by Yield Increase / Quality Control / Cost

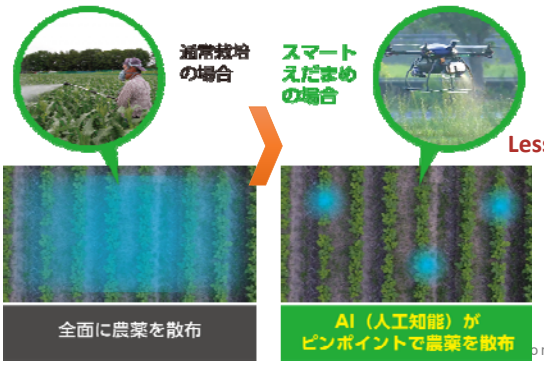
High-Value Added Solution（Drone Spot Spraying Technology for Rice Production）

Insects Spot Detection

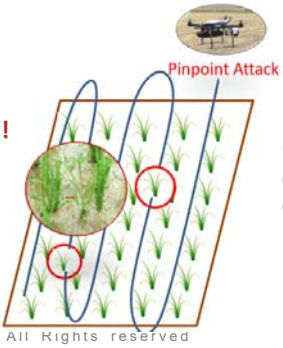
Plant Hoppers



Weed Detection



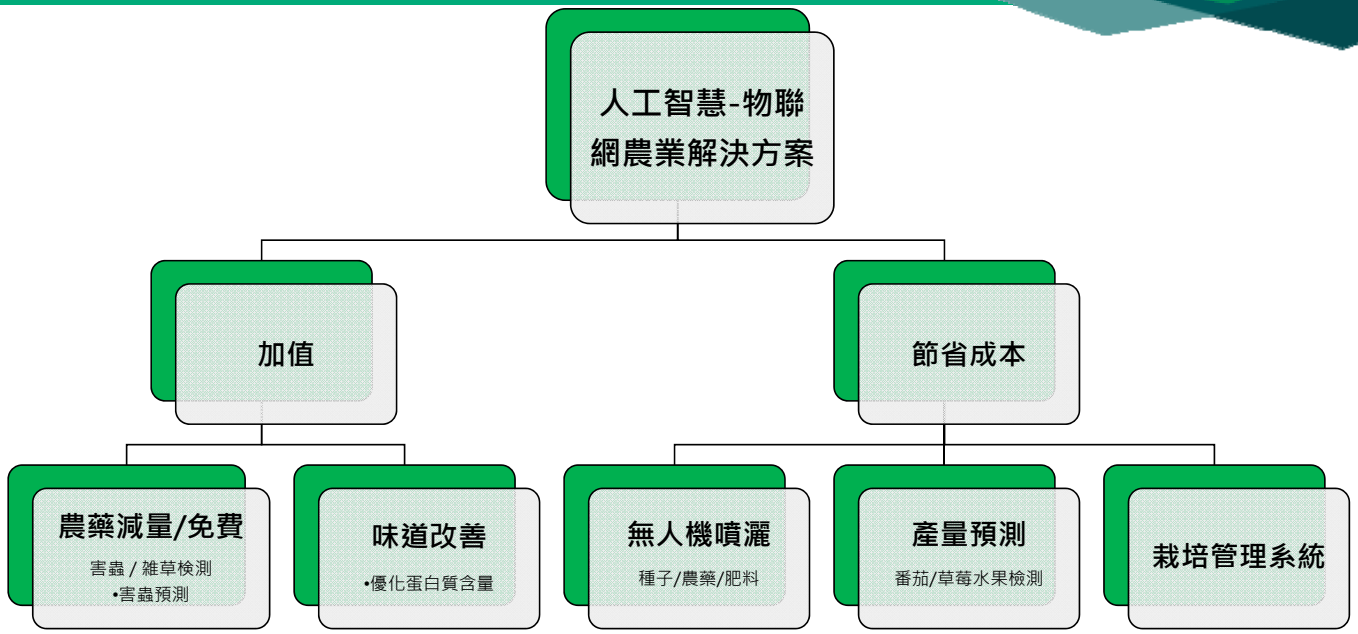
Less Pesticide!!



Spot Sprayingg between the lines!!

We are creating two types of AI prototype;
①Detecting Weeds themselves, or
②Detecting rice plants, which means the other plants are weeds
*in cooperation with Ishikawa agri-research center

人工智慧-物聯網農業解決方案



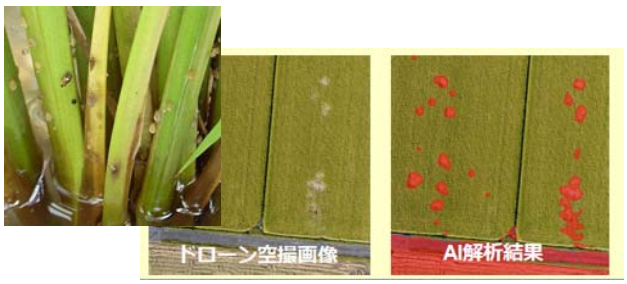
人工智慧-物聯網農業解決方案增加競爭優勢
產量增加/品質控制/成本

OPTiM

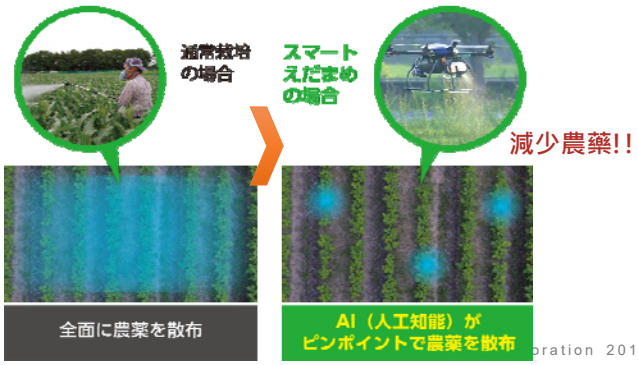
High-Value Added Solution（Drone Spot Spraying Technology for Rice Production）

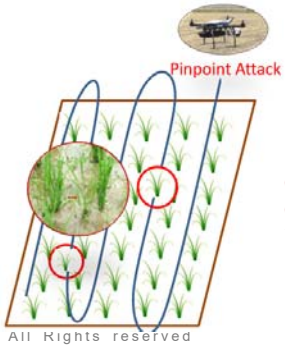
昆蟲定點檢測

植物料斗



雜草檢測





田間定點噴灑！

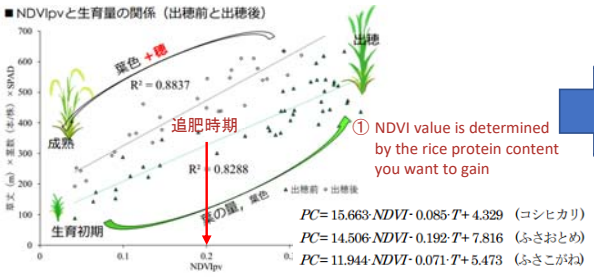
我們正在建立兩種AI原型;
①檢測雜草本身，或
②檢測水稻（非水稻植物為雜草）
*與石川縣農業研究中心合作

OPTiM

Value-Added Solution（Spot Spraying Fertilization in Rice Produciton）

Optimizing Fertilization ＝Stabilization of Yield and Quality (Protein Content)

（1）Calculate the optimized NDVI values

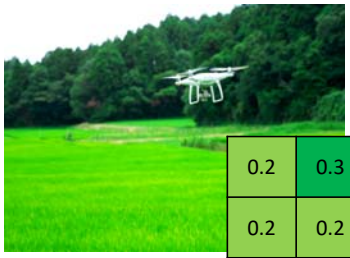


① NDVI value is determined by the rice protein content you want to gain

② Estimate the optimal NDVI

Data Accumulation

（2）Take Pictures with a multi-spectrum camera over the fields



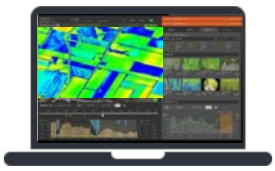
0.2	0.3	0.1
0.2	0.2	0.1
0.1	0.3	0.2

NDVI Map

（3）Spot Fertilization（Variable fertilization）

Spraying Drone

（4）Monitoring with app for farm management



Agri Field Manager

Drone Spot Spraying for Organic Agriculture

【Overview】

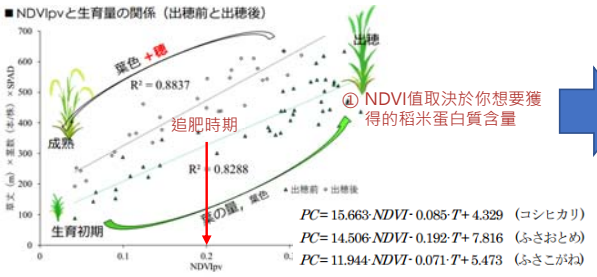
- Farm：One Drop Farm (Size：15a per each)
- Address　：272, Takakura, Chiba, Japan
- Technology：Drone Spot Spraying to the Damaged Spots in Organic Agriculture

項目	Cabbage	Broccolio	Chinese Cabbage
Cultiveation period	Seeding：Aug Planting：Sep Harvest：Jan 	Seeding：Aug Planting：Sep Harvest：Jan 	Seeding：Aug Planting：Sep Harvest：Jan–Feb 
Variety	Misaki	Pixel	Wawasai
場所	One drop farm（Chiba）	One drop farm（Chiba）	One drop farm（Chiba）
Drone/ Target	Shooting period： September (After planting) Armyworm, Buleworm etc.	Shooting period： September (After planting) Armyworm, Bule worm etc.	Shooting period： September (After planting) Armyworm, Bule worm etc.
The effect of solution	**・Cost Reduction of Farming materials** **・Time Reduction of Monitoring** **・Utilization of the Drone images for Workers' Education**		

加值解決方案（在稻米生產過程中定點噴灑肥料）

優化施肥 ＝穩定產量和品質（蛋白質含量）

（1）計算優化的NDVI值

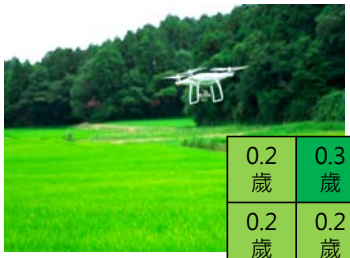


① NDVI值取決於你想要獲得的稻米蛋白質含量

② 估計最佳NDVI值

數據累積

（2）使用多光譜相機拍攝田間照片



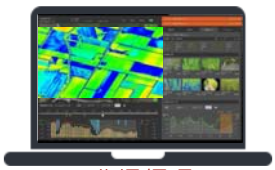
0.2歲	0.3歲	0.1歲
0.2歲	0.2歲	0.1歲
0.1歲	0.3歲	0.2歲

NDVI地圖

（3）定點施肥（變量施肥）

噴灑無人機

（4）用應用程序監控農場管理



農場經理

用於有機農業的無人機定點噴灑

【概述】

- 農場：One Drop農場（面積：每人15a）
- 地址：272, Takakura, Chiba, Japan
- 技術：無人機定點噴灑有機農田中的病蟲害點

項目	高麗菜	綠花椰菜	大白菜
栽種期	播種：八月 種植：九月 採收：一月 	播種：八月 種植：九月 採收：一月 	播種：八月 種植：九月 採收：兩月 
品種	Misaki	Pixel	Wawasai
場所	One Drop農場（Chiba）	One Drop農場（Chiba）	One Drop農場（Chiba）
無人機/目標	拍攝期： 九月（種植後） 秋行軍蟲、Buleworm等	拍攝期： 九月（種植後） 秋行軍蟲、Buleworm等	拍攝期： 九月（種植後） 秋行軍蟲、Buleworm等
解決方案的效果	·降低農業資材成本 ·減少監測時間 ·利用無人機影像進行教育訓練		

Yield Prediction System (Object Detection and Maturity Degree)

OPTiM Crawler

Multi Camera Capability

High Level Camera Stabilization

AI Edge Computing Module

Auto Driving System

4WS/4WD Driving

Object

Color

Temperature

Consulting Service : Banana/Pineapple Solutions (Philippines)

Drone Shooting

Discussion with local researchers

Banana image

Pineapple image

Project scope list

產量預測系統（物體檢測和成熟度）

OPTiM Crawler

- 多重相機功能
- 高級相機穩定性
- AI 邊緣計算模組
- 自動駕駛系統
- 4WS/4WD駕駛

物體

+

顏色

+

溫度

諮詢服務：香蕉/鳳梨解決方案（菲律賓）

無人機拍攝

與當地研究人員討論

香蕉影像

鳳梨影像

計畫範圍清單