AI-Based Smart Agriculture Local Model Demonstration and Pilot Implementation in Malaysia

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Introduction

National Information Society Agency
- Statutory organization of the Ministry of the Science and ICT and the Ministry of the Interior and Safety

National Digital Strategy
- National Informatization Plan,
- Digital Platform Government Roadmap,
- etc.

National Digital Infrastructure
- Open Data
- Network
- Cloud
- Artificial Intelligence
- Digital Government

Digital Inclusion
Smart Village
AI Training Data Release
Capacity Building
IT Cooperation Project
Joint Project with IOs & MDB

Domestic Projects (Budget: $700M, 2023)
Global Projects (Budget: $10M, 2023)
Overview

AI-Based Smart Agriculture Local Model Demonstration and Pilot Implementation

✓ Country: Malaysia
✓ Period: August 20, 2021 – September 20, 2022
✓ Project Location: Alex NP Farm, Selangor
✓ Target Crop: Pineapple
✓ Target Area: 5 acres (Pilot Test Area 330m²)
✓ Purpose:

- Reduced Pesticide Use
- Decreased Irrigation and Fertilizer Use
- Convenient Control
Challenges

• Field Situation

✓ Unstable **power supply**

✓ Lack of **Internet Connection**

✓ Lack of **Water Supply Infrastructure**

✓ Farmers are not familiar with **smart devices**

✓ Consideration of **environmental factors** such as floods, lightning, and insects is necessary
Overview of AI-based Smart Agriculture Local Model

1. Power Supply (Solar Panel)
2. IoT Sensor (Wind Speed, Soil Moisture, Temperature, Humidity, Rainfall, etc.)
3. WiFi Router Set (WiFi Routers, Gateway, Data Logger)
4. Real-Time Weather Information API
5. NAVER Cloud Server
   Cloud-Based AI Algorithm
   - Irrigation Predictive Model
   - Disease/Pest Predictive Model
   - Alert of Irrigation Schedule
   - Disease/Pest Risk Warning
7. Mobile App
   - Real Time System Monitoring & Control
   - Weather Data Updates and Analysis

- Irrigation
- Fertigation
- Disease & Pest Prediction
- Mealy Bug Detection
Cloud-Based AI Algorithm

1. Irrigation Prediction Algorithm

- **Irrigation Control Logic**
  - Sensor Data (Soil moisture, evapotranspiration etc)
  - Weather Forecast data

- **AI Prediction Algorithm**
  - Irrigation/Week \( I_w > 0 \) mm?
  - Calculate Irrigation in mm/day= \( A \times I_w \times 60 \) / \( F \times 7 \times 1000 \)

- **Irrigation min/day (IMD) = \( A \times I_w \times 60 \) / \( F \times 7 \times 1000 \)**

- **Pump Working Calculation for pump control**
  - Pump Day/Night Calculation in Minute
  - WateringDayWT= 0.7*IMD
  - WateringDayIT= 720- WateringDayWT
  - WateringNightWT= 0.3*IMD
  - WateringNightIT= 720- WateringNightWT

- **Pump Status Notifications**
- **Automated Pump Control**
- **Irrigation & Fertilizer Scheduling**
- **Pest Forecast Monitoring**
- **Pest Warnings**
- **Fungicide Use Reminders**

2. Pest Prediction Algorithm

- Based-on the trained data of the environment when pests and diseases occurred
Mobile Service UX/UI

Dashboard

Irrigation Alert

Remote Irrigation Control

Pest Forecast Monitoring and Pest Warning

Weekly Weather Forecast, Daily Data Monitoring
# Achievement at a glance

<table>
<thead>
<tr>
<th>Deliverables</th>
<th>Achievement</th>
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</thead>
<tbody>
<tr>
<td>Irrigation System</td>
<td>30-40 % Water Savings</td>
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<tr>
<td>Fertigation System</td>
<td>30% Less Fertilizer</td>
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<tr>
<td>FCR and LP Disease Control</td>
<td>50-70 % Less fungicide</td>
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<tr>
<td>Pineapple Mealybug Control</td>
<td>35-40% Pesticide reduction</td>
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<tr>
<td>Labor reduction (Expected)</td>
<td>50-70% based on automation</td>
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<tr>
<td>Carbon emissions</td>
<td>30-35% reduction</td>
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<tr>
<td>Fertilizer and Pesticide (Cost Savings)-10 acre</td>
<td>RM19,500 (USD 4115)</td>
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