GreenHouse

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LoRa®

GREEN HOUSE

Protecting Japan's Harvest: LoRa-Enabled Wildlife Monitoring Reduces Farm Labor and Crop Losses

GreenHouse Co., Ltd. developed an IoT trap monitoring system using LoRaWAN® technology to protect Japanese farms from wild animal damage. The solution eliminates the need for farmers to manually inspect thousands of traps across mountainous terrain by delivering instant notifications when wildlife is captured. With 500 units deployed and plans to expand to 10,000, this system significantly reduces labor burden while protecting crops.

QUICKFACTS

Company
GreenHouse Co., Ltd.
www.green-house.co.jp

Customer Profile
Green House Co., Ltd., headquartered in Shibuya Ward, Tokyo, is a comprehensive manufacturer of electronic devices that handles a wide range of products, including computer peripherals, video and audio equipment, kitchen goods, sales promotional products, OEM products, and IoT solutions.

Objectives
The main objective was to protect agricultural crops from wild animal damage by implementing an efficient IoT-based monitoring system. LoRaWAN technology enabled long-range communication (400-500m) with low power consumption, allowing farmers and agricultural managers to monitor crop protection systems remotely without frequent physical inspections, reducing labor burden in agricultural communities.

Results
- Deployment of 500 units in the initial year.
- 10,000 units planned for future expansion.
- Successfully prevented crop damage across multiple agricultural areas during a 4-month trial period (June-September).
- Achieved communication distances of 400-500m, significantly exceeding Wi-Fi range (20-30m) with equal power consumption.
- Reduced patrol and inspection workload for agricultural workers.
- Enabled timely response to wildlife intrusions, protecting crop yields.

Products and Services
- Semtech's LoRa Edge™ technology. LR1120
- Private LoRaWAN® network infrastructure

INTRODUCTION

Wild animal damage in Japan includes various types of harm caused by wild animals, specifically damage to crops and forests, intrusion into houses, and threats to humans. Agricultural damage is particularly severe, with deer and wild boars eating crops and destroying fields. Forest damage includes bark stripping and disruption of the forest ecosystem balance.

GreenHouse developed an IoT trap monitoring system to address these challenges by installing animal-proof fences with wild animal capture detection sensors connected via LoRaWAN technology.

CHALLENGE

The main challenge was balancing power consumption and communication distance across expansive agricultural areas and remote farmland. Traditional crop protection monitoring methods required agricultural workers to physically inspect protection systems daily, which was Labor-intensive for:

- Labor-intensive for farming communities managing large agricultural areas (30 traps per person, 2,000-3,000 traps total in the area)
- Time-consuming in dispersed farmlands and mountainous terrain
- Inefficient, requiring constant patrols regardless of actual intrusion events
- Resulted in delayed response to crop damage incidents

Additionally, Wi-Fi technology only provided 20-30m range, which was insufficient for the dispersed trap locations in forests and fields.

SOLUTION

The solution consists of an IoT trap monitoring system using LoRaWAN technology:

SYSTEM ARCHITECTURE

- **Trap Sensor Device:** LR1120 module attached to box traps that detects when an animal is caught
- **Communication:** When triggered, the sensor transmits data via LoRaWAN to the IoT Station through Kerlink gateways
- **Notification:** Farm managers receive instant notifications via mobile phone or PC email
- **Coverage:** Gateway optimal placement achieved 78.3% coverage across 203 test locations in Ina City

TECHNICAL FEATURES:

- LoRaWAN certified design
- Custom RF module development
- 8-hour heartbeat communication for device status monitoring
- Immediate alert upon intrusion detection
- Maximum communication range tested at 9km in outdoor conditions

IMPLEMENTATION PARTNERS

- **Development:** GreenHouse/Shinko Shoji
- **Research collaboration:** National universities in Nagano Prefecture
- **Network infrastructure:** Agricultual Association of Ina City on Broadcasting & Telephone Service,called as INA-AINET

HOW IT WORKS:

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BENEFITS

Extended Range: LoRa communication distance of 400-500m far exceeded Wi-Fi (20-30m) with equivalent power consumption

Wide Area Coverage: Single gateway covers broad areas, reducing infrastructure costs

Reduced Labor Burden: Eliminated need for daily physical inspections, enabling more focus on agriculture

Timely notifications: Instant notifications enabled quick response to wildlife intrusions, minimizing crop damage

Cost-Effective Operation: No carrier network fees required with private LoRaWAN deployment

User-Friendly: Simple, easy-to-understand notification system

Scalability: System designed for horizontal expansion to other regions and municipalities

Future Enhancement Potential: Plans to integrate 2.4GHz LoRa for photo, compressed video, and geolocation capabilities

Population Management: Contributes to increasing wild animal population control and reducing buffer zones

Crop Protection: Significantly reduces agricultural losses and protects food production in rural communities

Learn More: www.semtech.com/lora

About Semtech

Semtech Corporation (Nasdaq: SMTC) is a high-performance semiconductor, IoT systems and cloud connectivity service provider dedicated to delivering high-quality technology solutions that enable a smarter, more connected and sustainable planet. Our global teams are committed to empowering solution architects and application developers to develop breakthrough products for the infrastructure, industrial and consumer markets.

To learn more about Semtech technology, visit us at **Semtech.com** or follow us on **LinkedIn** or **X.**

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