LoRaWAN®

USE CASE

PRESERVING TREE HEALTH WITH A SIMPLE LoRaWAN® SENSOR

AGRICULTURE

It has been estimated that the annual global impact of invasive species totals over $1.4 trillion dollars, or roughly 5% of the world economy. Beyond economic terms, the problem seriously impacts both biodiversity, where nearly half of the species protected under the Endangered Species Act are directly threatened, and horticulture.

Invasive insects that burrow into trees are among the most difficult of dangerous exotic species to detect and eliminate. The Emerald Ash Borer, discovered in 2002 near Detroit, Michigan, quickly spread to 25 states. This insect was responsible for $10.7 billion dollars in treatment, removal, and tree replacement costs.

Traditional and current insect monitoring and eradication is extremely challenging, particularly due to the scope of the endeavor. It is

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costly, labor intensive, time consuming and sometimes hazardous to human health. These obstacles themselves limit the amount of manual insect monitoring, which in turn leads to significant crop loss due to the failure of curtailing pests.

CHALLENGE

The red palm weevil represents another challenging invasive insect wreaking havoc on palm trees, particularly because visible signs and symptoms of attack appear only when it is too late to save the tree. Naturally found in Southeast Asia, the red palm weevil spread around the world since it was first detected in the 1980s. Islands are among the most vulnerable to invasive species such as the red palm weevil because they can host a variety of pests without a diverse range of wildlife to counter the attack.

The weevil quickly colonizes and the larvae begin to tunnel into the heart of the tree, resulting in symptoms like wilting and yellowing of leaves, often visible long after infestation. The problem is so serious that the UN Food and Agriculture Organization (FAO) gathered international agricultural, pest control and biological experts convened in Rome in 2017 to come up with a comprehensive plan to stop the spread of the insect.

One conclusion, as summarized by FAO Assistant Director-General and Regional Representative for Near East and North Africa, Abdessalam Ould Ahmed: "Insufficient implementation of phytosanitary standards, lack of an effective preventive strategy and insufficient monitoring of response measures explain the failure in containing the pest so far."

SOLUTION

However, there is hope that the insect can be controlled. Companies like Agrint, providing innovative sensing technology, and MultiTech, designing, developing and manufacturing data communications equipment for IIoT, have partnered to offer solutions. Their primary goal is to provide business owners and employees with early detection and alerts whenever a red palm weevil arrives to threaten a tree.

More specifically, the aim is to provide global data analysis through cloud-based servers and web-based software applications where all information can be accessed via an intuitive and easy-to-use dashboard installed on PC and mobile devices so that staff can receive weevil alerts anytime, anywhere.

The underlying technology behind the IoT solution is a LoRaWAN®-enabled network of connected devices that collect and share data

with low cost, low power and wide area capabilities. Each tree is outfitted with a durable and energy efficient sensor to detect the larvae activity. The sensors are highly sensitive to the slightest movements, even larvae in its early stages of development. They also filter out anything that could lead to a false alarm.

The information and detection measures are continuously sent in real-time to your computer, mobile device or tablet. The easy-to-navigate app allows for instant access to critical information that can pinpoint an infested tree and save it from destruction. In addition, all data is further used for larger analysis, such as watching evolving trends to ensure business owners are always one step ahead of pest behavioral patterns.

BENEFITS

Once the network and sensors are deployed, which is surprisingly quick and inexpensive, data is instantly collected and shared. The first benefit is then realized — the early detection and subsequent treatment of a tree to prevent its collapse. The sensors can also monitor tree treatment, ensuring pesticides are used only when and as much as needed to have its desired effects and limiting overuse. For example, pesticides can now target only the trees that need them. This preventative solution helps to avoid the costly replacement of dead trees, reduces the cost of pesticides and increases total yield for a fast and substantial ROI.

Partnerships such as that of Agrint and Multi-Tech represent exciting opportunities and reasons to remain optimistic as governments and private businesses work to manage the spread of invasive species across the globe. Applying LoRaWAN-enabled IoT technology to agriculture in the battle against pests like the red palm weevil is merely at the beginning stages. These solutions already offer the previously impossible detection of animals, plants, and pathogens that harm Earth's biodiversity and cost billions in damage and to remove.