Science, Technology, Research and Innovation for Development (STRIDE)

Design, Development, and Packaging of an Internet of Things (IoT) Monitoring and Intelligent Control System for Crop Heat Stress

GRANTEE: University of Southeastern Philippines (USeP)

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INDUSTRY PARTNER: CloudFarm Innovations, Inc.

COLLABORATING PARTNER: Western Mindanao State University (WMSU)

GRANT PERIOD: September 1, 2016 to August 31, 2017

GRANT AMOUNT: Php 4,799,703.85 (approximately USD102,100)

A networked smart farming system

Crop heat stress is the primary reason farmers suffer from reduced crop yields; 35% (1.7 million out of 4.8 million crop farms) of the total farms in the Philippines were greatly affected with an annual loss of USD602 million (Php 10 billion). Crop heat stress is a condition that negatively affects growth, survival, and yield, caused by erratic weather patterns with extremely high temperatures. Accurate care and monitoring for crops are difficult with the current traditional methods of farming. In the Philippines, there are fewer technology aids available to farmers, which lack is compounded by the prohibitive cost of such technologies. Data collection in agriculture for analytics, research, and development is still conducted manually for the most part, and access to data for smarter farming is limited for most farmers.

Interface of the mobile app developed by the research team

Given this prevailing situation, the USeP, in collaboration with WMSU and CloudFarm Innovations, Inc., and with support from USAID STRIDE, proposed a solution through the project to design, develop, and package a monitoring system for heat stress through the IoT.

In this undertaking, the research team is poised to come up with an effective technology to counter heat stress that would be accessible to most farmers through utilization of an IoT monitoring and intelligent control system. The technology would enable farmers to do smart farming that will help them maximize their yield with the fewest inputs. In the City of Zamboanga, the project will perform a user assessment and market validation with key stakeholders.

The project is basically an IoT smart sensor and app that allows farmers to maximize their yield through advance monitoring and analytics of crop condition. It gives farmers a better picture of how their crops are coping with heat stress and enables them to take preventive measures.

1. Monitoring: The device monitors environmental conditions of the crop by measuring the heat levels, light intensity, relative humidity, soil moisture, and potentially other important parameters, which all remotely transmit to an app. This allows farmers not only to monitor their crops real-time but also to be notified whenever a heat stress problem regarding the crops needs to be addressed.

Inspection of crops grown under the net or screen

2. Analytics: Data gathered from the device will be analyzed to show detailed progress of the crop, providing farmers with the needed data tools, like historical trends, statistics, and recommendations based on analytics for a smarter way of improving crops growth.
3. Control: Crop heat stress is automatically controlled in a greenhouse equipped with pre-installed systems on the field and other components such as sprinklers, exhaust fans, and growing lights.

Among the outcomes that farmers are to expect from this project include increased crop yields and efficient use of water and land resources. Analysis and implementation of appropriate solutions have been made accessible for the farmers through their mobile phones or tablets to help them make wiser decisions on crop development. A successful completion of this study will empower Filipino farmers to apply a Philippine-developed precision agriculture system and share this concept of smart farming to other farming systems in the country. In addition, such demonstrated technology will help link larger commercial operations in crop production to adopt this innovation in their farms and attract younger people to the profession of agribusiness. The availability of real time data processing and the interactive technology of IoT/smart agriculture would surely be an added incentive for the millennial generation to consider agriculture.