WSN System Warns Atta Cephalotes Climbing in Mango Fruit Trees

Authors : Federico Hahn Schlam, Fermín Martínez Solís

Abstract : Leaf-cutting ants (Atta cephalotes) forage from mango tree leaves and flowers to feed their colony. Farmers find it difficult to control ants due to the great quantity of trees grown in commercial orchards. In this article, IoT can support farmers for ant detection in real time, as production losses can be considered of 324 US per tree.A wireless sensor network, WSN, was developed to warn the farmer from ant presence in trees during a night. Mango trees were gathered into groups of 9 trees, where the central tree holds the master microcontroller, and the other eight trees presented slave microcontrollers (nodes). At each node, anemitter diode-photodiode unitdetects ants climbing up. A capacitor is chargedand discharged after being sampled every ten minutes. The system usesBLE (Bluetooth Low Energy) to communicate between the master microcontroller by BLE.When ants were detected the number of the tree was transmitted via LoRa from the masterto the producer smartphone to warn him. In this paper, BLE, LoRa, and energy consumption were studied under variable vegetation in the orchard. During 2018, 19 trees were attacked by ants, and ants fed 26.3% of flowers and 73.7% of leaves.

Keywords : BLE, atta cephalotes, LoRa, WSN-smartphone, energy consumption

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