2023 International Conference on Integrative Precision Agriculture – Local Solutions Though Global Advances

Cheap, Robust, and Secure Wireless Sensing and Logistics: A Feasibility Study

P. Kudyba[1], Dr. H. Sun[1]

[1] Electrical and Computer Engineering, University of Georgia, Athens, GA, USA
* Corresponding author: hsun@uga.edu

Abstract

Food waste is a significant contributor to reduced food security. Many current logistic solutions allow the location tracking of produce from farm to table. Still, bringing the freshest produce to market and avoiding waste will require continuous and secure sensing along the entire supply chain.

In this preliminary study, we look into a new technology of low-power wireless tagging that allows for the tracking and sensing of temperature while ensuring data security. The primary goal of this ongoing investigation is to understand, create, and enable tracking and sensing solutions to securely collect data to know better when a food product will no longer be fresh or might soon spoil. This data can then be provided to the supplier, seller, and consumer to prevent food waste and guarantee a great product.

The tags use a standard Bluetooth low-energy protocol to transmit. All individual tag data is encrypted before being wirelessly transmitted. The sensor and ID data remains safely encrypted while uploaded, enabling trust in the system's data collection and preventing abuse or tampering. The tag's location is appended by the device that wirelessly powers and receives the tag data. This location data is also encrypted as it is continuously uploaded to the cloud.

Thus Far, the tags have been tested with the original equipment supplied by the manufacturer. Further studies are ongoing to provide more tools that securely work with this sensor tagging technology to wirelessly power, transmit a tag's data, and ensure robust and continuous transmission. By enabling open-source methods of acquiring a tag's location and sensing data, we hope to reduce food waste in a cheap, robust, and secure way.

Keywords: Internet of Things, Cyber Physical Systems, Wireless Communication