Implementation of IoT System on Smart Scales for Crystal Guava Fruit Harvest
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ABSTRACT

This study aims to implement an Internet of Things (IoT)-based Smart Scales system capable of monitoring, calculating, and recapitulating crystal guava harvest weighing results automatically and in real-time. The system was designed using load cell sensors, HX711 modules, ESP32 microcontrollers, a Kodular-based smartphone application, Google Sheets and local storage, as well as a thermal printer. The application functions to display weight data in real-time, automatically calculate prices based on price per kilogram, store transaction data in Google Sheets and local storage, and print receipts using a thermal printer via Bluetooth connection. The test results showed an average data reception delay of 932.2–1006.2 ms under non-obstructed conditions and 1007.2–1146.4 ms under obstructed conditions. Bluetooth signal strength testing showed an average signal strength ranging from -14.8 dBm to -36 dBm under non-obstructed conditions and -21.4 dBm to -36.6 dBm under obstructed conditions. In addition, the receipt printing process and data storage to Google Sheets were successfully carried out without communication failures. Based on these results, the IoT-based Smart Scales system is capable of supporting crystal guava harvest weighing processes in a more modern, efficient, and integrated manner.

Key words*: IoT, ESP32, Bluetooth, Smart Scales, Kodular, Google Sheets, Crystal Guava.*