

SMART SCALES CONTROL SYSTEM BASED ON INTERNET OF THINGS USING ESP32 FOR CRYSTAL GUAVA MONITORING

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ABSTRACT

This research was conducted to design and implement an Internet of Things-based Smart Scales control system using ESP32 for monitoring the harvest of Crystal Guava. The system was designed with four load cell sensors connected via a summing board and an HX711 module to read weight values. The data obtained was then processed by an ESP32 microcontroller, displayed on a 128x64 graphic LCD, and sent via Bluetooth to the application. This system also includes battery voltage monitoring using a resistor voltage divider and an LM2596 step-down module to reduce the voltage of a 12V lithium-ion battery. The research stages used included the system design stage, system programming using the Arduino IDE, hardware and software calibration processes, and system testing at several measurement positions. Hardware calibration was carried out via a summing board to equalize the readings of each load cell sensor, while software calibration was carried out by adjusting the calibration factor value in the ESP32 program. System testing was carried out at the middle position, L1, L2, L3, and L4 using several variations of loads and Crystal Guava fruit as test objects. Based on the results of the research conducted, the system successfully read and processed weight data well. Test results showed the system produced relatively stable readings at each test position, with a maximum error of 0.33%. Furthermore, the system's data filtering process helps reduce noise, resulting in more stable measurement results. Furthermore, the system displays weight data on a 128x64 graphic LCD and transmits data via Bluetooth, as designed.

Keywords: *Smart Scales, ESP32, Load Cell, HX711, Bluetooth, Internet of Things.*