

ABSTRAK

RANCANG BANGUN SISTEM AKUISISI DATA BERAT SAYURAN MENGUNAKAN SENSOR LOAD CELL BERBASIS RASPBERRY PI CM4

(2026: xiv + 79 Halaman + 61 Gambar + 18 Tabel + Daftar Pustaka + Lampiran)

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Penelitian ini merancang dan membangun perangkat keras sistem akuisisi data berat sayuran berbasis Raspberry Pi CM4, menggunakan sensor Load cell tipe strain gauge berkapasitas 180 kg, modul ADC HX711 24-bit, LCD 16×2, dan push button. Pengujian dilakukan melalui kalibrasi serta variasi dan pengulangan beban referensi 1–30 kg untuk menilai akurasi, presisi, dan stabilitas pembacaan. Setelah dikalibrasi dengan faktor kalibrasi 24,1850, instrumen mencapai akurasi 99,50%–99,98%, dengan nilai Relative Standard Deviation (RSD) konsisten di bawah 1% pada uji pengulangan maupun stabilitas, serta drift pembacaan terjaga dalam pita $\pm 0,02$ kg. Data penimbangan otomatis terkirim secara real-time ke Google Sheets melalui workflow n8n disertai layanan chatbot WhatsApp berbasis kecerdasan buatan untuk pemantauan jarak jauh. Sistem terbukti akurat, presisi, dan stabil, sehingga layak digunakan sebagai instrumen digitalisasi penimbangan komoditas sayuran di pasar tradisional.

Kata Kunci: Akuisisi Data, Load Cell, HX711, Raspberry Pi CM4, Internet of Things.

ABSTRACT

DESIGN AND CONSTRUCTION OF A VEGETABLE WEIGHT DATA ACQUISITION SYSTEM USING LOAD CELL SENSOR BASED ON RASPBERRY PI CM4

(2026: xiv + 79 Pages + 61 Figures + 18 Tables + Bibliography + Appendices)

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This research designed and built the hardware of a vegetable weight data acquisition system based on Raspberry Pi CM4, using a strain gauge type Load cell sensor with a 180 kg capacity, a 24-bit HX711 ADC module, a 16×2 LCD, and a push button. Testing was carried out through calibration as well as variation and repetition of reference loads from 1–30 kg to evaluate the accuracy, precision, and stability of the readings. After being calibrated with a calibration factor of 24.1850, the instrument achieved a measurement accuracy of 99.50%–99.98%, with a Relative Standard Deviation (RSD) consistently below 1% in both repeatability and stability tests, and a reading drift maintained within a ± 0.02 kg band. The weighing data was automatically transmitted in real-time to Google Sheets via the n8n workflow, accompanied by an artificial intelligence-based WhatsApp chatbot service for remote monitoring. The system is proven to be accurate, precise, and stable, making it feasible as a digitalization instrument for weighing vegetable commodities in traditional markets.

Keywords: *Data Acquisition, Load Cell, HX711, Raspberry Pi CM4, Internet of Things.*