PERANCANGAN SISTEM PENYIMPANAN CERDAS BERBASIS PID *CONTROLLER* DAN *INTERNET OF THINGS* (IOT) UNTUK PENGENDALIAN KESEGARAN BUAH ALPUKAT

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ABSTRAK

Penelitian ini merancang dan menguji sistem penyimpanan cerdas berbasis *Proportional Integral Derivative* (PID) *Controller* dan teknologi *Internet of Things* (IoT) untuk mempertahankan kesegaran buah alpukat selama masa simpan. Sistem menggunakan elemen peltier sebagai pendingin ramah lingkungan, sensor DHT22 untuk pemantauan suhu, serta Raspberry Pi Pico W sebagai pengendali utama. Pemantauan suhu dilakukan secara *real-time* melalui aplikasi Blynk. *Tuning* PID dilakukan secara manual dengan nilai optimal Kp = 450, Ki = 0,5; dan Kd = 0,075; menghasilkan suhu yang stabil mendekati *set point* 23°C. Hasil pengujian menunjukkan sistem efektif menjaga suhu, namun keberadaan alpukat meningkatkan suhu akibat respirasi, yang memengaruhi efisiensi pendinginan dan konsumsi daya. Sensor DHT22 memberikan hasil yang memadai, namun data *logger* menunjukkan kestabilan yang lebih baik. Penerapan IoT terbukti meningkatkan fleksibilitas dan efisiensi pemantauan.

Kata kunci : Penyimpanan cerdas, PID, IoT, alpukat, elemen peltier.

DESIGN OF INTELLIGENT STORAGE SYSTEM BASED ON PID CONTROLLER AND INTERNET OF THINGS (IOT) FOR AVOCADO FRESHNESS CONTROL

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ABSTRAK

This study designs and tests an intelligent storage system based on Proportional Integral Derivative (PID) Controller and Internet of Things (IoT) technology to maintain the freshness of avocados during their shelf life. The system uses a Peltier element as an environmentally friendly cooler, a DHT22 sensor for temperature monitoring, and a Raspberry Pi Pico W as the main controller. Temperature monitoring is carried out in real-time via the Blynk application. PID tuning is done manually with optimal values of Kp = 450, Ki = 0.5, and Kd = 0.075, resulting in a stable temperature approaching the set point of 23°C. The test results show that the system is effective in maintaining temperature, but the presence of avocados increases the temperature due to respiration, which affects cooling efficiency and power consumption. The DHT22 sensor provides adequate results, but the data logger shows better stability. The application of IoT has been shown to increase the flexibility and efficiency of monitoring.

Keywords: Intelligent storage, PID, IoT, avocado, Peltier element.