

ABSTRAK

Sistem Kendali Monitoring Untuk Penyimpanan Dan Pengeringan Bawang Merah Dengan Metode *Simple Additive Weighting* (Software) (2026: +Pages+Picture+Tables+Attachments+List of References)

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Bawang merah merupakan komoditas hortikultura dengan nilai ekonomi tinggi tercatat data Badan Pusat Statistik (BPS) menyatakan produksi bawang merah Indonesia pada tahun 2024 mencapai sekitar 2,09 juta ton, meningkat sebesar 5,06% dibandingkan tahun 2023 namun bawang juga mudah mengalami penurunan kualitas akibat kadar air yang tinggi. Kondisi cuaca yang tidak menentu selama proses pengeringan berdasarkan data Badan Meteorologi, Klimatologi, dan Geofisika (BMKG), dengan curah hujan di Provinsi Sumatera Selatan mencapai 3.151,9 mm/tahun pada tahun 2024, menyebabkan proses pengeringan bawang merah secara konvensional menjadi kurang optimal. Hal ini berpengaruh dalam meningkatkan kualitas produksi panen bawang. Oleh karena itu, diperlukan suatu sistem yang mampu membantu proses *monitoring* dan pengendalian pengeringan agar kualitas serta daya simpan bawang merah tetap terjaga. Penelitian berfokus pada pengembangan sistem *monitoring* dalam pengendalian penyimpanan serta pengeringan bawang merah berbasis *Internet of Things* (IoT). Metode *Simple Additive Weighting* (SAW) digunakan untuk menentukan waktu pengeringan yang paling optimal sebagai metode pendukung keputusan untuk menentukan set point waktu pengeringan, sedangkan hasil perhitungannya dimasukkan ke dalam aplikasi sebelum proses pengeringan dimulai. Perancangan alat dengan memanfaatkan ESP32 sebagai *mikrokontroler*, sensor DHT22 untuk membaca suhu dan kelembapan, LCD 20x4 sebagai media tampilan lokal, relay sebagai pengendali *heater dan exhaust fan*, serta MIT App Inventor yang terhubung melalui Adafruit IO sebagai media monitoring dan pengendalian berbasis Android. Berdasarkan hasil pengujian, sistem mampu membaca data suhu dan kelembapan secara *real-time*, menampilkan informasi pada LCD dan aplikasi Android, serta mengendalikan proses pengeringan sesuai waktu yang telah ditentukan. Hasil perhitungan metode SAW menunjukkan bahwa alternatif 60 menit memperoleh nilai preferensi tertinggi sebesar 0,867, sehingga dipilih sebagai waktu pengeringan yang paling optimal. Pada kondisi tersebut, suhu ruang pengering mencapai sekitar 50°C dengan kelembapan sekitar 38%RH. Sistem yang dikembangkan mampu membantu proses monitoring maksimal 10kg bawang dalam proses pengeringan selama 60 menit.

Kata kunci: *Internet of Things*, ESP32, DHT22, MIT App Inventor, Adafruit IO, *Simple Additive Weighting*, bawang merah.

ABSTRACT

Design of a Monitoring System for Shallot Storage and Drying Using the Simple Additive Weighting Method (Software)
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Shallots are one of the horticultural commodities with high economic value. According to data from the Central Bureau of Statistics (BPS), Indonesia's shallot production reached approximately 2.09 million tons in 2024, an increase of 5.06% compared to 2023. However, shallots are susceptible to quality deterioration due to their high moisture content. In addition, unpredictable weather conditions during the drying process, based on data from the Meteorological, Climatological, and Geophysical Agency (BMKG), indicate that the annual rainfall in South Sumatra Province reached 3,151.9 mm in 2024, making conventional shallot drying less effective. This condition affects the improvement of harvested shallot quality. Therefore, a system capable of monitoring and controlling the drying process is required to maintain the quality and storage life of shallots. This research focuses on the development of an Internet of Things (IoT)-based monitoring and control system for shallot storage and drying. The Simple Additive Weighting (SAW) method was employed to determine the optimum drying time as a decision-support method for selecting the drying time set point, while the calculation results were entered into the application before the drying process began. The system was designed using an ESP32 microcontroller, a DHT22 sensor to measure temperature and humidity, a 20×4 LCD as a local display, a relay to control the heater and exhaust fan, and MIT App Inventor integrated with Adafruit IO as an Android-based monitoring and control platform. Based on the test results, the system was able to monitor temperature and humidity in real time, display information on both the LCD and the Android application, and control the drying process according to the predetermined drying time. The SAW calculation results showed that the 60-minute alternative achieved the highest preference value of 0.867, making it the optimum drying duration. Under these conditions, the drying chamber temperature reached approximately 50°C with a relative humidity of approximately 38% RH. The developed system was capable of supporting the monitoring and drying process of up to 10 kg of shallots within a 60-minute drying period.

Keywords: *Internet of Things, ESP32, DHT22, MIT App Inventor, Adafruit IO, Simple Additive Weighting, shallots*