ABSTRAK

Permasalahan efisiensi dalam proses perontokan dan pemisahan gabah masih menjadi tantangan pada alat berskala kecil. Penelitian ini bertujuan merancang, membangun, dan menganalisis prototipe alat perontok padi dan pemisah gabah berbasis Arduino Mega dengan kendali logika *fuzzy*, yang mampu menyesuaikan kecepatan motor secara otomatis berdasarkan nilai arus beban dan putaran silinder. Sistem ini menggunakan motor DC, sensor arus ACS712, sensor RPM berbasis IR, sensor jarak HC-SR04, dan LCD untuk tampilan status. Metode inferensi Mamdani diterapkan dengan dua variabel *input*: arus dan RPM, serta satu *output* berupa sinyal PWM. Prototipe diuji pada skala 1:3 dengan catu daya baterai lithium-ion 3s2p. Hasil menunjukkan alat mampu merontokkan padi pada massa 10–100g dengan rata-rata kebersihan perontokan sebesar 92,86%. Namun, penambahan massa 10g tidak signifikan memengaruhi respon logika *fuzzy* akibat perubahan arus dan RPM yang minim. Alat pemisah gabah berfungsi, namun kinerjanya belum optimal karena penggunaan motor DC tunggal untuk silinder dan kipas. Selain itu, keterbatasan akurasi timbangan turut memengaruhi hasil pengukuran tingkat keberhasilan pemisahan gabah.

Kata kunci: perontok padi, pemisah gabah, Arduino Mega, kendali logika *fuzzy*, metode inferensi Mamdani.

ABSTRACT

Efficiency issues in rice threshing and grain separation processes remain a challenge for small-scale equipment. This study aims to design, develop, and analyze a prototype of a rice threshing and husk separating device based on Arduino Mega, equipped with fuzzy logic control capable of automatically adjusting motor speed based on load current and cylinder rotation. The system employs a DC motor, ACS712 current sensor, IR-based RPM sensor, HC-SR04 distance sensor, and an LCD for status display. The Mamdani inference method is applied using two input variables—current and RPM—and one output in the form of a PWM signal. The prototype was tested at a 1:3 scale with a 3s2p lithium-ion battery power supply. Results show that the device is capable of threshing rice within a mass range of 10–100g, achieving an average threshing cleanliness of 92.86%. However, an additional 10g mass did not significantly affect the fuzzy logic response due to minimal variations in current and RPM. The grain separator functioned but showed suboptimal performance, as a single DC motor was used to drive both the threshing cylinder and the fan. Furthermore, the limited accuracy of the weighing scale affected the measurement of grain separation effectiveness.

Keywords: *rice threshing, grain separator, Arduino Mega, fuzzy logic control, Mamdani inference method.*