

DESIGNING AND DEVELOPING AN AUTOMATED RICE HUSK SEPARATOR, WEIGHING DEVICE, AND MOISTURE CONTENT METER BASED ON ESP32

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ABSTRACT

*Post-harvest challenges in rice grain processing—such as separating filled and unfilled grains, weighing yields, and measuring moisture content—are traditionally performed manually using separate devices. This approach is inefficient, labor-intensive, prone to human error, and results in delayed operations and increased operational costs, especially for small-scale farmers. Addressing these issues, this study presents the design and development of an integrated, automated system capable of performing all three functions using the ESP32 microcontroller platform. The system incorporates an ultrasonic sensor for grain detection, a servo motor to control output flow, a fan to separate filled from unfilled grains, a load cell for automatic weighing, and a humidity sensor to measure moisture content. Measurement data are displayed in real time via an LCD interface. Experimental results demonstrate that the device operates autonomously with a moisture sensor accuracy rate averaging **93.99%**, effectively streamlining post-harvest workflows. With its portable and user-friendly design, this innovation offers a practical solution for agricultural modernization through automation and smart sensing technologies.*

Keywords: *ESP32, rice grain, load cell, moisture, automation*