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Portable PLC Based Automatic ABACA Fiber Extraction Machine using Decortication Method

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Abstract: Abaca fibers are highly valued for their renewable, biodegradable, sustainable, and eco-friendly qualities, making them an excellent alternative to synthetic fibers. However, the conventional extraction process remains labor-intensive and hazardous. This study presents the development of a PLC-based automatic abaca fiber extraction machine using the decorticating method. The prototype was designed, fabricated, and evaluated based on its efficiency, performance, and operational safety. Key components of the machine include a Programmable Logic Controller (PLC) for automation, a Variable Frequency Drive (VFD) for motor speed control, and a Human-Machine Interface (HMI) for real-time monitoring. Developed at Mindanao State University –Iligan Institute of Technology, the prototype underwent multiple test runs to assess its repeatability, efficiency, and capacity. The machine achieved a decorticating efficiency of 72.34%, with processing capacities of 3.67 g/hr . It also attained a 100% success rate (519.4 g output), demonstrating strong functional reliability in extracting abaca fibers. Additionally, performance evaluations conducted with 25 abaca farmers indicated generally positive feedback, particularly highlighting the machine's potential to enhance safety and productivity. The results suggest that the proposed design offers a viable solution to the challenges associated with traditional abaca fiber extraction.

Key Words: programmable logic controller (plc), decortication method, human machine interface (HMI), automated system, abaca extraction

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