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IoT-Based Areca Nut Dryer and Segregator: An Automated Solution for Agricultural Processing

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Abstract: *This paper presents an innovative IoT-based system for the automated drying and segregation of areca nuts, addressing the inefficiencies of traditional processing methods. The proposed system integrates a controlled drying chamber with temperature and humidity sensors (DHT11), a PTC heating element, and gear motors for adaptive drying, supplemented by an optional sunlight exposure mechanism. A Raspberry Pi-based vision system, utilizing image processing and machine learning, automates the segregation of areca nuts into good and defective categories on a conveyor belt, with a stepper motor-driven ejector ensuring precise sorting. Real-time monitoring and remote control are enabled through a Dart-based mobile application, leveraging MQTT for seamless cloud connectivity. Experimental results demonstrate that the system achieves uniform drying with a temperature regulation accuracy of ±2°C, reduces processing time by 40% compared to manual methods, and achieves a segregation accuracy of 92%. This IoT-driven approach minimizes energy consumption, enhances product quality, and reduces labor dependency, offering a scalable solution for small-scale farmers and large-scale agricultural industries*

Keywords: Areca Nut Processing, IoT, Automated Drying, Image Processing, Machine Learning, Segregation, Smart Agriculture, ESP32-CAM, Machine Learning, MQTT, Arduino Uno, Vision Systems, Remote Monitoring

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