

AUTOMATIC CONVEYOR MECHATRONICS SYSTEM USING RASPBERRY PI, HUSKYLENS, AND TOGGLE-SWITCHING SEPARATORS

ABSTRACT

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This study developed an automatic conveyor mechatronics system intended to modernize mango sorting and quality-control processes. The system used a Raspberry Pi 5, a HUSKYLENS artificial-intelligence vision sensor, and toggle-switching separators to recognize, classify, and route products with limited human intervention. It also incorporated access control and renewable-energy features to support operational efficiency, reduce error, and improve productivity in agricultural and industrial settings. The study used experimental prototyping and a system-development methodology. The prototype was built around a Raspberry Pi 5 with Arduino Mega and Arduino Uno microcontrollers. A HUSKYLENS sensor performed real-time object classification, infrared sensors tracked products, servo motors directed products, and an RFID module restricted access to authorized users. A solar-powered automatic transfer switch supported continued operation. Hardware and software tests assessed functionality, and a descriptive survey using a five-point Likert scale was analyzed through weighted mean, frequency, and percentage. The developed system automated the detection, classification, and routing of mangoes. HUSKYLENS performed real-time recognition, the RFID module supported access security, and the conveyor and toggle-switching separators sorted products according to predefined criteria. Evaluation results were described as satisfactory in sustainability, portability, safety, economic viability, and compliance with engineering standards. Survey respondents also reported favorable perceptions of the system's efficiency and reliability. The findings suggest that embedded systems, AI-based vision, and automated controls can support mango sorting and quality-control processes. The prototype was intended to reduce manual handling, limit errors, support workplace safety, and use solar energy. Its limitations included heavier-load handling and scalability. Further development and quantitative performance testing are needed before application in agricultural, warehousing, or logistics environments.

RECOMMENDED CITATION

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