



WAREHOUSE INVENTORY MANAGEMENT SYSTEM

UNDERGRADUATE THESIS

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ABSTRACT

Manual inventory validation in warehouse environments often leads to significant inefficiencies and human error. This project addresses these challenges by designing and implementing a real-time, automated inventory validation module for a smart warehouse system. The system integrates a load cell for precise weight measurement, a QR code scanner for accurate label identification using ESP32 Cam for the camera, and an Arduino Mega 2560 R3 microcontroller to manage conveyor belt operations. This integrated approach automates the validation process by cross-referencing an item's measured weight and scanned QR code data. Verified inventory records are then transmitted to a central backend system using the MQTT protocol. By automating these checks, the system significantly enhances validation accuracy, reduces manual labor, and enables seamless, real-time data processing for more efficient warehouse management.

Keywords: *Smart Warehouse, Real-Time Monitoring, Inventory Validation, ESP32 Cam, QR Printer Automated Systems*

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