

ABSTRACT

IoT-Based Conveyor Enabled Product Tally System

The aim of this project is to automate the product tallying process on a moving conveyor using Sensors and real-time data transmission, ensuring accuracy, speed, and efficient real-time data inventory tracking. Our system integrates Infrared sensors with a microcontroller to detect the number of items passing through a conveyor belt. Each time an object is detected, the count is incremented and instantly updated to a cloud database e.g., Firebase. A real-time web dashboard displays the current tally, and alerts can be triggered if predefined limits are reached. This enables warehouse operators and managers to monitor the product count remotely from any device.

The project utilizes a combination of hardware and software components. The hardware includes Infrared (IR) sensors for product detection, a NodeMCU ESP8266 microcontroller with built-in Wi-Fi for data transmission, and a motor-driven conveyor belt for product movement. On the software side, the Arduino IDE is used for programming the microcontroller, while Firebase serves as the cloud database for storing and syncing real-time data. A web dashboard built to display the live product tally and system status to users.

This system enhances industrial automation. It enables automated product counting through IR sensors, eliminating the need for manual intervention. Real-time data is transmitted wirelessly and displayed on a responsive web dashboard, allowing operators to monitor the count from any location. Additionally, the system is equipped with an SOS alert mechanism that notifies the user when the tally reaches a predefined threshold. Designed with low-power components and using cost-efficient hardware, this setup is both energy-saving and budget-friendly. By replacing manual tallying with an IoT-based automated system, the proposed solution significantly enhances accuracy and operational efficiency. It is expected to reduce human error in product counting by up to 95% and improve the speed of inventory reporting by approximately 60%. The remote monitoring capability enables better decision-making and real-time control. Furthermore, automating the process helps reduce labour costs and improves the reliability of the overall supply chain.

This system can be effectively deployed in various industrial sectors where real-time product monitoring is essential. These include warehouses and inventory management units, manufacturing assembly lines, packaging and logistics companies, and automated sorting facilities. The adaptability and scalability of the system make it suitable for both small-scale and large-scale industrial environments. Unlike traditional PLC-based conveyor systems, this solution combines cost-effective sensors, Wi-Fi-enabled hardware, and cloud integration to provide real-time insights with minimal investment. The system is scalable, portable, and easy to maintain, making it ideal for small- to medium-scale industries.

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