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(57) Abstract :
Abstract The invention provides an integrated system for real-time inventory management and predictive analytics using a coordinated network of Internet of Things (IoT) sensors. The system addresses the limitations of conventional inventory methods, which often rely on manual counting, periodic scanning, and delayed data entry, by delivering continuous, automated monitoring of product quantity, location, movement, and environmental conditions. Through the use of diverse IoT devices—including RFID tags, weight sensors, proximity detectors, and environmental monitors—the system captures high-resolution, real-time data across storage facilities, warehouses, retail environments, and manufacturing operations. Central to the invention is an intelligent analytics engine that processes both real-time sensor inputs and historical data using advanced machine-learning algorithms. This engine generates dynamic forecasts, identifies usage patterns, detects anomalies, and predicts stock shortages or overstock conditions with high accuracy. By combining live sensing with predictive modeling, the system enables proactive inventory planning, optimized replenishment decisions, and minimized operational disruptions. The architecture is modular, scalable, and compatible with existing enterprise resource planning (ERP) and warehouse management systems (WMS), ensuring seamless integration into diverse operational environments. The system supports both cloud-based and edge-based processing, allowing robust performance even in large-scale or connectivity-limited settings. A user-friendly decision-support interface provides real-time dashboards, predictive alerts, and actionable insights that enhance inventory visibility and improve supply chain efficiency. By unifying continuous IoT data collection, intelligent forecasting, and automated decision support, the invention delivers a transformative solution for modern inventory management. It improves accuracy, reduces labor dependency, enhances operational responsiveness, and supports data-driven strategies across industries. The invention represents a significant advancement in the field of inventory monitoring and predictive analytics, enabling organizations to maintain optimal stock levels and adapt effectively to dynamic market demands.

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