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A Study on Smart Warehousing Using IOT and Robotics in Amazon Warehouse in Coimbatore

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Abstract: ***Smart warehousing integrates Internet of Things (IoT), robotics, automation, and advanced data analytics to improve warehouse efficiency and accuracy. With the rapid growth of e-commerce and global trade, traditional warehouse systems are being replaced with technology-driven operations. This study examines the role of IoT and robotics in smart warehousing, analyzes key benefits and challenges, and evaluates technological improvements in warehouse management.***
Keywords: Smart Warehousing, Internet of Things (IoT), Robotics, Automation, Warehouse Management System (WMS), Inventory Control, Supply Chain Management.

I. INTRODUCTION

Smart warehousing is a modern warehouse management approach that uses IoT devices, robotics, artificial intelligence, and cloud computing to automate warehouse operations. These technologies help in real-time inventory tracking, faster order processing, and reduced operational errors. With increasing customer demand for faster delivery, smart warehouses play a crucial role in supply chain efficiency.

II. OBJECTIVES OF THE STUDY

1) To understand the concept of smart warehousing.
2) To analyze the role of IoT and robotics in warehouse operations.
3) To examine technological recommendations for improving warehouse efficiency.
4) To evaluate benefits and challenges of automation.

III. RESEARCH METHODOLOGY

The study is based on secondary data collected from research articles, web resources, and the reference material provided. A descriptive research design is adopted to analyze technological implementation and its impact on warehouse performance.

IV. TECHNOLOGIES USED IN SMART WAREHOUSING

1) Internet of Things (IoT): Enables real-time tracking using RFID, sensors, and GPS.
2) Robotics: Autonomous Mobile Robots (AMRs) assist in picking, sorting, and transporting goods.
3) Warehouse Management System (WMS): Integrates data for inventory and shipment control.
4) Artificial Intelligence: Supports demand forecasting and predictive analytics.

V. DATA ANALYSIS

Table 1: Technology Preference for Improving Warehouse Efficiency

Technology	Number of Respondents	Percentage
IoT Tracking Systems	40	26.7%
Autonomous Robots	35	23.3%
Smart Delivery Drones	25	16.7%
AI-Based Inventory System	30	20.0%
Electric Handling Equipment	20	13.3%

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- Interpretation: The table shows that 26.7% of respondents prefer IoT tracking systems to improve warehouse efficiency, followed by 23.3% preferring autonomous robots. AI-based inventory systems account for 20%, while smart delivery drones and electric handling equipment are preferred by 16.7% and 13.3% respectively. This indicates that real-time tracking and automation are the most preferred technologies for smart warehousing improvement.

Table 2: Level of satisfaction with smart warehouse technologies

Satisfaction level	Number of respondents	Percentages (%)
Highly satisfied	28	56%
Satisfied	15	30%
Neutral	5	10%
Dissatisfied	2	4%
Total	50	100%

- Interpretation: The table shows that 56% of respondents are highly satisfied with smart warehouse technologies, while 30% are satisfied. Only 4% expressed dissatisfaction. This indicates that the majority of respondents have a positive perception of IoT and robotics implementation in warehouse operations.

Table 3: Impact of smart warehousing on operational efficiency

Level of improvement	Number of respondents	Percentages (%)
Very high improvement	22	44%
High improvement	18	36%
Moderate improvement	7	14%
Low improvement	3	6%
Total	50	100%

- Interpretation: The above table reveals that 44% of respondents believe smart warehousing has brought very high improvement in operational efficiency, while 36% report high improvement. Only 6% perceive low improvement. This shows that smart technologies significantly enhance warehouse performance.

VI. FINDINGS

1) IoT tracking systems are the most preferred technology.
2) Robotics significantly improves order accuracy and speed.
3) Automation reduces operational cost in the long term.
4) Technology adoption increases warehouse productivity.

VII. SUGGESTIONS

1) Implement IoT-based inventory systems for real-time visibility.
2) Adopt robotics gradually to reduce financial burden.
3) Provide employee training for handling smart technologies.
4) Strengthen cybersecurity measures in automated systems.

VIII. CONCLUSION

The study concludes that smart warehousing using IoT and robotics enhances operational efficiency, accuracy, and customer satisfaction. Though initial investment is high, long-term benefits such as cost reduction, faster processing, and better inventory control make it a vital strategy for modern supply chain management.

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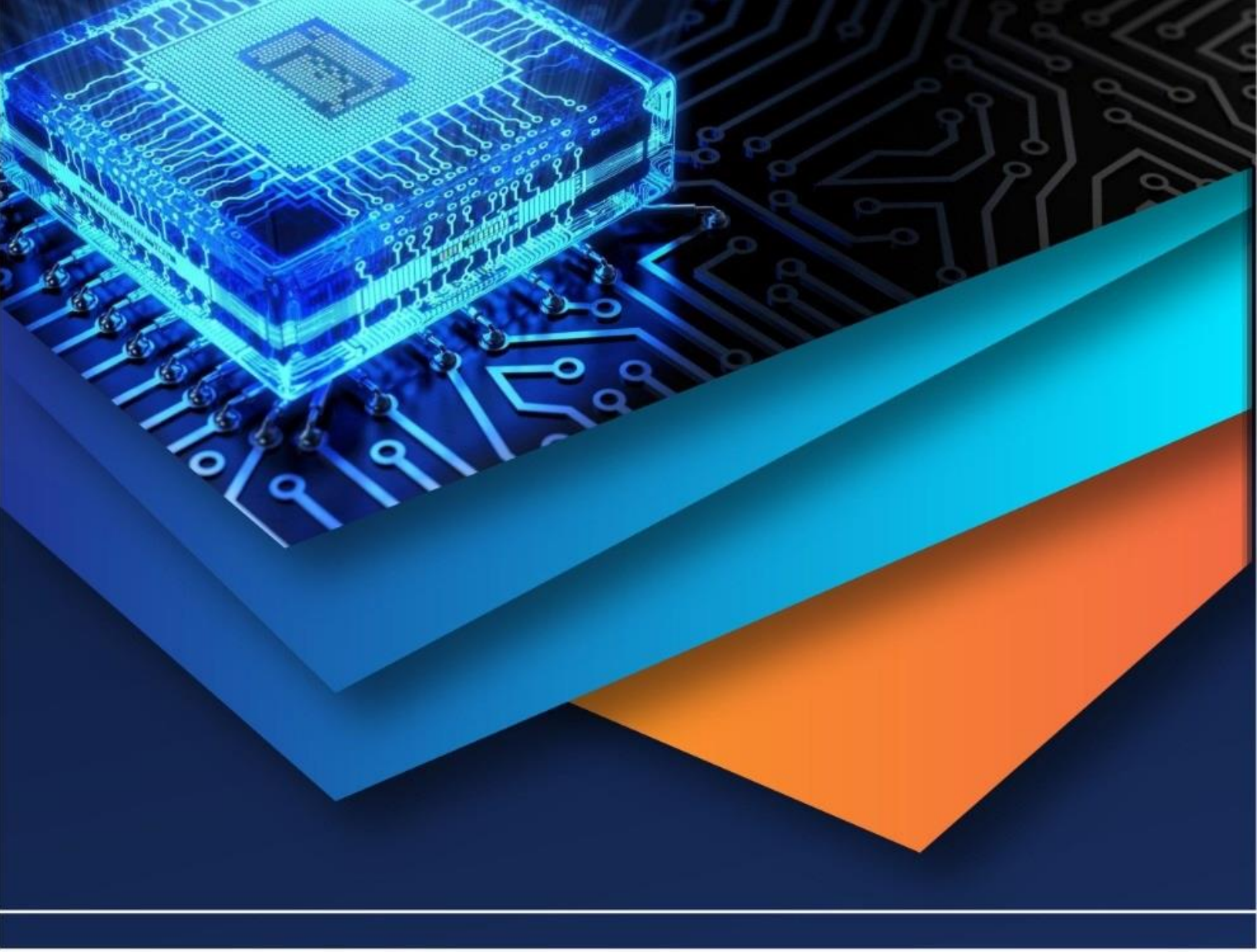

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