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TITLE VERSO

Title of the Book

[INTERNATIONAL CONFERENCE ON RECENT TRENDS IN RESEARCH AND INNOVATION] (ICRTRI 2025)

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Editor: Dr.M.Kannan

Co-Editor: Dr.Samson Dinakaran

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AI-BASED PREDICTIVE MAINTENANCE FOR ENHANCING EFFICIENCY IN TEXTILE MACHINERY

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ABSTRACT

The textile industry heavily relies on complex machinery, where unexpected failures lead to downtime, increased costs, and production inefficiencies. This study explores AI-based predictive maintenance as a solution to enhance the operational efficiency of textile machinery. By leveraging machine learning algorithms and IoT-enabled sensors, real-time data on machine performance is collected and analyzed to predict potential failures before they occur. Deep learning models identify patterns in equipment behavior, enabling proactive maintenance and reducing unplanned disruptions. The proposed approach enhances machine lifespan, minimizes downtime, and optimizes production efficiency. Additionally, integrating AI-driven anomaly detection improves accuracy in fault diagnosis, reducing maintenance costs. Case studies demonstrate the effectiveness of AI models in predicting breakdowns, ensuring continuous operation in textile manufacturing. The findings suggest that AI-based predictive maintenance is a transformative approach, leading to cost savings, improved productivity, and sustainable manufacturing in the textile industry.