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Patent Search

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Abstract:

Machine Learning Integrated IoT System for Smart Waste Segregation and Recycling ABSTRACT The invention pertains to a Machine Learning Integrated IoT System for Waste Segregation and Recycling, aimed at enhancing the efficiency and effectiveness of waste management processes. The system integrates advanced Internet of Things (IoT) sensors with machine learning (ML) algorithms to automate the waste classification, segregation, and recycling process. IoT sensors are deployed at key waste collection points to capture real-time data about the waste, such as size, weight, shape, and material properties. This data is then processed by a machine learning model hosted on a cloud server, which classifies the waste into categories such as plastics, metals, organic waste, glass, and paper. Once classified, the system activates automated sorting mechanisms using robotic arms or conveyor belts, to segregate the waste into designated recycling streams. The machine learning model continuously improves its classification accuracy through real-time data feedback, enhancing the system's ability to handle diverse waste streams and evolving waste patterns. The system provides real-time monitoring and performance analytics via a user-friendly interface, allowing operators to track waste collection, recycling rates, and system performance. By automating waste segregation and improving classification accuracy, the system reduces human intervention, minimizes contamination of recyclable materials, and increases the overall efficiency of recycling operations. This invention provides a scalable and adaptable solution for waste management, applicable to both small-scale residential applications and large-scale industrial waste systems. The integration of IoT and ML not only optimizes recycling processes but also contributes to reducing environmental impact by ensuring more materials are recycled and fewer end up in landfills. The system represents a significant advancement in the field of waste management, offering an intelligent, sustainable, and efficient approach to managing and recycling waste.

Complete Specification

Description: Machine Learning Integrated IoT System for Smart Waste Segregation and Recycling
FIELD OF THE INVENTION

The present invention relates to the field of waste management systems, specifically to an integrated Internet of Things (IoT) system that utilizes machine learning (ML) for automated waste segregation and recycling. This system aims to optimize the efficiency and accuracy of waste sorting and recycling by leveraging real-time data collection, advanced classification algorithms, and automated sorting mechanisms. The invention addresses the challenges of manual waste segregation, promoting more efficient recycling practices and reducing environmental impact through automation and intelligent decision-making.

BACKGROUND OF THE INVENTION

The management of waste is one of the most pressing global challenges faced by governments, municipalities, and organizations around the world. The increasing urbanization, industrialization, and population growth have led to an unprecedented rise in the amount of waste generated daily. According to the World Bank, the waste generation is expected to rise to 3.4 billion tons annually by 2050, an increase of 70% from current levels. Managing such a vast amount of waste is not only a logistical challenge but also a serious environmental concern. Improper waste disposal leads to pollution, contamination of water sources, soil degradation, and contributes significantly to greenhouse gas emissions. The need for more efficient and sustainable waste management practices has never been more urgent.

Historically, waste management has been a manual and labor-intensive process, where the responsibility of sorting and segregating waste rests with humans. These processes are typically performed in waste collection centers or at landfills, where workers separate recyclable materials from non-recyclable ones. This method is not only time-consuming but also prone to human error. Additionally, the growing complexity of waste streams, with diverse types of materials such as plastics, metals, glass,

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