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Smart Waste Segregation and Management

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ABSTRACT—

The world population reached 8 billion, and the need for smart cities has increased. We need to keep our cities clean and hygienic. A huge world population has led to the production of a large amount of waste. And the procedure to process this waste is very tedious. Modern problems require a modern solution. Technology has always helped mankind with its problems. Automation helps to prevent the accumulation of waste. The sorting of the waste is designed in a way to allow the easy disposal of collected waste. Waste is collected in basically three categories. Wet waste, dry waste, and metal waste. Artificial technology is being used to detect incoming waste and classifies it as metallic, dry or wet using various sensors connected to the system and divert the waste to the appropriate bin. After the sorting is done, the waste is deflected using servomotors, which are programmed according to the requirement. The rising level in the container bin is monitored using the ultrasound sensor present in it. Authorized personnel is notified of the rising waste in the container. The personnel then empties the bin. Automation reduces human interference in the process and thus ensures the successful collection of waste in the appropriate time..

Keywords— Segregation, Recycling, Rapid industrialization, Improper waste management, Automated trash bin, waste Segregation..

I. Introduction

Cities all over the world are facing major problems due to urbanization, one of the biggest problems is the increase of waste and waste products due to the high demand for food and other important substances. General rubbish collects faster than usual, and many are not disturbed before collection. In many developed countries, garbage collection systems are good enough to prevent major disasters, while in some cities, local government's neglect of sanitation has killed at-risk people. In today's waste management, many people are assigned to deal with the large number of bins; this is done periodically throughout the day. This leads to a very dirty and inefficient situation where some buckets will overflow and others will not be half full.Due to rapid population change or some decisions, it is not possible to say which parts of the city require urgent intervention. There are many specific procedures for the management and disposal of waste. But the lack of knowledge is very difficult. This inequality hinders the development of many countries in urban areas and increases the need for urban protection.

II. Related work

[1] "Intelligent Waste Collection System Using Wireless Sensor Networks" by Huaqun Guo et al. (2015): This research proposes a waste collection system based on wireless sensor networks (WSNs). The system employs smart bins equipped with sensors to monitor waste levels and uses WSNs to transmit the data to a central server. The study demonstrates the effectiveness of the system in improving waste collection efficiency.

[2] "Optimization of Waste Collection Routes Using Genetic Algorithm" by Iliana D. Poulidou et al. (2017): This study focuses on optimizing waste collection routes using genetic algorithms. The researchers developed a model that considers various factors such as waste generation rates, bin capacities, and collection vehicle capacities. The proposed approach aims to minimize travel distances and reduce collection costs.

[3] "Smart Bins: A Review of Smart Waste Management System" by Abhishek Appaji (2018): This paper provides an overview of various smart waste management systems, including smart bins. It discusses the use of IoT, sensors, and data analytics to monitor waste levels, optimize collection routes, and enhance waste segregation. The study highlights the benefits and challenges associated with implementing such systems.

[4] "Intelligent Waste Management System for Smart Cities" by Hassan A. A. Al-Fatlawi et al. (2019): This study proposes an intelligent waste management system that utilizes Internet of Things (IoT) sensors and data analytics to optimize waste collection and disposal in smart cities. The system uses real-time data to monitor waste levels, optimize waste collection routes, and promote recycling.

[5] "Machine Learning-Based Waste Sorting for Recycling: A Review" by Mahesh M. Jadhav et al. (2021): This review paper explores the application of machine learning techniques for waste sorting in recycling processes. It discusses various machine learning algorithms, such as neural networks and support vector machines, and their use in identifying and categorizing different types of waste materials.

III. Keywords

1. Separation: Separation is the process of separating different types of waste according to their characteristics such as recyclability, biodegradability, or hazardousness. Proper waste segregation is essential for proper waste management and recycling.

2. Recycling: Recycling involves converting waste materials into reusable materials or products through various processes. It helps to reduce raw material consumption, save energy and reduce the environmental impact associated with waste disposal.

3. Rapid Industrialization: Rapid industrialization refers to the rapid growth and expansion of the economy in a region or country. Due to increased production and consumption, it often leads to an increase in waste generation, so effective waste management strategies are needed to reduce environmental and health risks.

4. Poor waste management: Poor waste management refers to the improper handling, collection, treatment and disposal of waste. It includes applications such as open dumping, unregulated landfills, or non-recycling facilities. Improper waste management can lead to pollution, health hazards and environmental damage.

5. Automatic garbage disposal: The automatic trash can or smart trash can is a trash can with technologies such as sensors and IoT connections to help you get a lot of work done. These bins automatically monitor fill levels, improve waste collection and simplify waste separation and management.

6. Garbage Separation: Garbage sorting is the process of separating different types of waste into groups according to their characteristics. The most common categories include recyclables (such as paper, plastic, glass, and metal), organic waste, and solid waste. Waste separation contributes to effective waste management, recycling, and disposal.

IV. Application

1. Efficient waste collection: Intelligent waste management systems use real-time data from in-process equipment to monitor collection levels. This information improves the waste collection team's routes and schedules, ensuring the bins are emptied at the right time. It reduces unnecessary trips, saves fuel and improves overall efficiency.

2. Waste separation and Recycling: Intelligent waste management can assist in the disposal and recycling process. Combining sensors and image recognition technology, these systems can identify and identify different types of waste.

This automation simplifies the recycling process, increases accuracy and improves the recovery of critical resources.

3. Infection Control: Contamination in streams can prevent regeneration. Intelligent waste management can use sensors and analytical data to detect contaminants in waste, such as non-recyclable or hazardous materials. Early detection can speed up waste removal or separation, making things more efficient.

4. Behavior Analysis and Learning: Smart waste management systems can understand the behavior of waste producers by monitoring and analyzing waste generation patterns.

This information can be used to educate individuals and communities on appropriate waste disposal practices, promote recycling and support waste reduction strategies.

5. Environmental monitoring: Intelligent waste management can contribute to environmental monitoring by integrating additional sensors such as air quality sensors into the waste management system. This integration enables real-time monitoring of the environment, providing important information for assessing and controlling the impact of waste on the environment.

6. Waste management planning: Information from intelligent waste management can be used for long-term planning and decision making. It helps waste management and organizations identify areas of high waste generation, improve waste management, allocate resources efficiently and implement waste reduction plans.

7. Cost Improvement: Intelligent waste management systems can help reduce costs, total waste management costs, by improving the way waste is collected, reducing waste and facilitating recycling. Using this system can save money for waste management and thus ensure the financial stability of the waste management process.

V. Limitations

1. Initial investment and infrastructure: Implementing smart waste management requires initial investment, including installing sensors, deploying IoT networks, and generating data management information. The high cost of this technology and infrastructure can be prohibitive, especially for small towns or regions with limited resources.

2. Maintenance and repair: Intelligent waste management systems require care and maintenance. Sensors need to be periodically measured or replaced, and the IoT network infrastructure needs to be monitored and managed. Sufficient resources and expertise are required to keep the system functioning properly and to resolve operational issues that may arise over time.

3. Less Service and Access: Intelligent waste management systems are usually implemented in a single area or region, providing fewer restrictions and easier access. This can lead to changes in waste management and efficiency in many areas. Providing wide coverage and access to systems can be difficult, especially in rural or underdeveloped areas with limited connections and resources.

4. Limitations: The effectiveness of smart waste management depends on the accuracy and reliability of the technology used, such as the sensors and data analysis algorithms. Limitations such as incorrect indicators, low battery, or incorrect algorithms can affect performance.

Continuous advances in technology are required to address these limitations and improve overall system reliability.

5. Participation and Compliance: The success of smart waste management depends on user participation and compliance with waste classification and disposal procedures. Individuals and communities must participate in waste segregation and adhere to consensus. Lack of information, change prevention or non-compliance can lead to poor process quality and pollution or ineffectiveness in the waste management process.

6.Data Privacy and Security: Intelligent waste management generates and processes large amounts of data, including personal or sensitive data. Ensuring data privacy and security is important in terms of protecting personal privacy and preventing unauthorized access or misuse of data. Strong data protection and compliance with privacy laws are important, but can present challenges for implementation and management.

7.Coordination and cooperation: The waste management process involves many stakeholders, including waste collection centers, recycling centers and authorities in the village. Integration and coordination between stakeholder processes and technologies can be difficult. Information sharing, standardization of processes and coordination of different organizations are necessary for efficient work and effective coordination.

VI. Conclusion

The behavior of waste products is very dangerous not only for the present generation but also for the future generations. People need to be educated and encouraged to recycle, reuse and reduce rather than create waste. Waste management should be a priority for cities and governments.

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VIII. References

[1] R.S.Sandhya Devi, Vijaykumar VR , M.Muthumeena, "Waste Segregation using Deep Learning Algorithm", International Journal of Innovative Technology and Exploring Engineering.

[2] Himadri Nath Saha, Supratim Auddy, Subrata Pal, Shubham Kumar, Shivesh Pandey, Rakhee Singh, Amrendra Kumar Singh, Swarnadeep Banerjee, Debmalya Ghosh, Sanhita Saha, "Waste Management using Internet of Things (IoT)", IEEE 2017.

[3] K.Harika, Muneerunnisa, V.Rajasekhar, P.Venkateswara Rao, L.J.N SreeLakshmi, "IOT Based Smart Garbage Monitoring and Alert System Using Arduino UNO".

[4] Marloun SEJERA, Joseph Bryan IBARRA, Anrol Sarah CANARE, Lyra ESCANO, Dianne Claudinne MAPANOO, John Phillip SUAVISO, "Standalone Frequency Based Automated Trash Bin and Segregator of Plastic Bottles and Tin Cans", IEEE 2016.

[5] Santhosh Kumar B R, Varalakshmi N, Soundarya S Lokeshwari, Rohit K, Manjunath, Sahana D N, "Eco-Friendly IOT Based Waste Segregation and Management", IEEE 2017.

[6] Shambala S Salunkhe, Madhuri D Yadav,Vrushali V Kulkarni,"IOT Based Waste Monitoring For Smart City", 2017

[7] Mrs.D.Anuradha, A.Vanitha, S.Padma Priya, S.Maheshwari, "Waste Management System Using Iot", 2017

[8] Http://www.conserve-energy-future.com/waste-management-andwaste-disposal-methods.php