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Report by:

1. SRIRAM V
2. SHARATH
VIGNESH S
3. RAGHUL S
4. PONSHAM S



DEPARTMENT OF INFORMATION TECHNOLOGY

IBM – LITERATURE SURVEY

PROJECT TITLE

**IoT BASED SMART WASTE MANAGEMENT SYSTEM FOR METROPOLITAN
CITIES**

(2022-2023)



Mentor Name: SOWJANYA , SANDEEP DOODIGANI

SUBMITTED BY

SRIRAM V (312419205101)

RAGHUL S (312419205078)

PONSHAM S (312419205075)

SHARATH VIGNESH (312419205091)

FINAL YEAR B.TECH (INFORMATION TECHNOLOGY)

ST. JOSEPH'S INSTITUTE OF TECHNOLOGY

OLL MAMALLAPURAM ROAD, SEMMANCHERI , CHENNAI,

TAMILNADU-600119

S. No	Title of the Project	Advantages	Disadvantages	Technology used
1.	Smart Waste Management system using IoT	<p>1)A reduction in the number of waste collections needed by up to 80%, resulting in less manpower, emissions, fuel use and traffic congestion.</p> <p>2)A reduction in the number of waste bins needed. Analytics data to manage collection routes and the placement of bins more effectively.</p>	<p>1)System requires more number of waste bins for separate waste collection as per population in the city. This results into high initial cost due to expensive smart dustbins compare to other methods.</p> <p>2)Sensor nodes used in the dustbins have limited memory size.</p>	Internet of Things(IOT) technology
2.	A Smart Waste Management with Self-Describing Complex Objects	<p>1)Saving time and money through automation. ...</p> <p>2)Improving data accuracy and availability. ...</p>	<p>1)RFID tags can suffer from orientation issues as sometimes these tags do not connect with the readers when both are misaligned concerning each other.</p> <p>2)The non-adoption of line of sight technology</p>	Radio Frequency Identification(RFID) technology
3.	Volunteer GIS(VGIS)Based Waste Management	<p>1)GIS technology has been recognised as one of the most promising approaches to automate the process of waste planning and management</p> <p>2)Geographic Information Systems (GIS) are one of the most sophisticated modern technologies to capture, store, manipulate, analyse and display spatial data</p>	<p>1)GIS setup is complex, in addition to the cost of the equipment, there is the cost incurred in training.</p> <p>2)Real-time parameters:The handling of growing datasets is an overall challenge to the GIS system</p>	Volunteer GIS(VGIS) technology

4.	Artificial Intelligence Based Smart Waste Management.	1)Reduction in Human Error, 2)Takes risks instead of Humans 3) Available 24x7, 4) Digital Assistance, 5) Faster Decision.	1)High Cost of Creation, 2)Difficulties with the software development for AI implementation	Artificial Intelligence(AI) technology.
5.	An Automated Machiine Learning Approach for Smart Waste Management.	1)Boost efficiency 2)Minimize the risk of human	1)Data Acquisition 2)AutoML needs more time to learn data. 3)High error susceptibility	Automated Machine Learning(AutoML) technology
6.	A Blockchain Based Approach Using Smart Contracts to Develop a Smart Waste Management System	1)Data Integrity 2)Free from Censorship 3)Blockchain technology is highly security and fast proccessor	1)Power Consumption is high. 2)High cost. 3)Difficulty of Development	Block chain technology.
7.	Smart Dustbin Using GPS Tracking	1)Improved Time management 2)Better Route Planning 3)Reduced operational cost	1)Increasing cost of the dustbin. 2)If there are three different levels then three sensors has to be placed; one sensor for each level. Also user may cause damages to the sensors	GPS Tracking technology.
8.	IOT Based Smart Dustbin Monitoring With Tracking System Using ATmega 2560 Microcontroller	1)Low power consumption with fast start-up 2)Easier to use, with 8-bit microcontroller being less complex than 32/64 bit versions	1)Limited amount of flash memory 2)Naturally lacks incremental performance compared to higher bit microcontrollers	ATmega 2560 Microcontroller technology.

9.	A Software Defined Networking(SDN) Architecture For Smart Trash Can Using IOT	1)Centralized network provisioning 2)More Granular Security 3)Lower Operating Cost	1)SDN Requires a change in the entire network infrastructure to implement SDN protocol and controller. 2)SDN needs complete reconfiguration of the network.	Software Defined Networking (SDN)technology.
10.	Rashperry Pi- Based Smart Waste Management System Using IOT	1)Raspberrry Pi is perfect fire adaptive technology and it is able to display images at high definition.	1)Not compatible with the other operating systems like WINDOWS	Raspberrry pi technology.

SMART WASTE MANAGEMENT SYSTEM

TEAM ID: PNT2022TMID28453

PROBLEM STATEMENT:

A big challenge in the urban cities is solid waste management. The garbage collecting authority in traditional waste management system doesn't know about the level of garbage in dustbin, if the dust bins gets full by garbage then it gets overflowed as well as spelled out from the dustbin leading to unhygienic condition in cities. People throw garbage on that dustbin which is already overflowed. Sometimes due to unclean garbage bins bad smell arises also toxic and unhygienic gases are produced which is way to support to the air pollution and to some harmful diseases which are easily spreadable. It is very bad look of the city. Use of traditional system result in inefficient and time and money spending system.

STEP 1

Problem Solving Cards

-Basic question

#Problem Statement

1. What's most valuable to the customer?
2. What are we the best at?
3. Where are we looking to improve?



STEP 2

Framing Statements

Smart waste management system framing

How can we use our **Optimization** skills to increase the customer's value of **Saving Time** in order to improve the **waste management**?



The greatest problem regarding waste management in developing countries begins at the very starting point of the process. Due to lack of proper systems for disposal and collections, wastes and garbage's end up in the roads and surrounding. According to a report from Google research, the amount of waste generation in 2010 was around 20,000 tons per day, and it is estimated that by 2025 the amount will be no less than around 47000 tons per day. With the existing methods of collecting and disposal it is near impossible to manage such amount of waste in the future as around 30% of waste end up on the roads and public places due to ineffective disposing and collecting methods. Not only that, there is even no systematic methodology for the collected garbage for treating and recycling thus most of them end up in land filling and river water, making the environment unhealthier. The prime impediment of implementing smart waste management system based on IoT in a developing country is the social and economic infrastructure of the country itself. The initial stage of this system comprises of proper disposal and collection, which is the biggest challenge. In addition, to motivate and influence people to follow proper waste disposal methods is also important.

STEP 3

Ideas

Problem Solution

Example ideas:

AI-based smart waste bin, designed for public places, enabling them to Monitor and Manage

Reduce the number of bins required & DE-cluttering and improving the street scene

Previously there were numerous initiatives on waste management and educating people to dispose waste properly, and as they failed to achieve significant results, we have figured out the scopes that could be develop. To solve this problem, we have designed a process that ensures proper disposal and efficient waste collection. The procedures we designed involves creative initiative that will inspire people to dump in designated area or bins, and innovative method by using Decreasing Time algorithm or DTA for monitoring garbage generation and collection of the garbage's.

