

# **Smart Waste Management System For Metropolitan Cities**

## **Team members:**

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## **Abstract:**

Solid waste management is currently a major concern in metropolitan areas of developing and industrialized countries. As the population increases, so does the amount of garbage. The unregulated accumulation of this large amount of garbage pollutes the environment, spoils the beauty of the area, and is also a health hazard. In this internet age, IOT (Internet of Things) can be effectively used to manage this solid waste. The article describes his cooja simulator, a tool for defining, testing and prototyping the Internet of Things and its elements, and finally studies various available literature on intelligent waste management systems using IoT. Explained .At present solid waste management is a major concern in the metropolitan cities of the developing and developed countries. As the population is growing, the garbage is also increasing. This huge unmanaged accumulation of garbage is polluting the environment, spoiling the beauty of the area and also leading to the health hazard. In this era of Internet, IOT (Internet of Things) can be used effectively to manage this solid waste. In this paper, we have discussed the definition of Internet of Things and its elements, testing and prototyping tool cooja simulator and finally the study of various literatures available on smart waste management system using IOT.

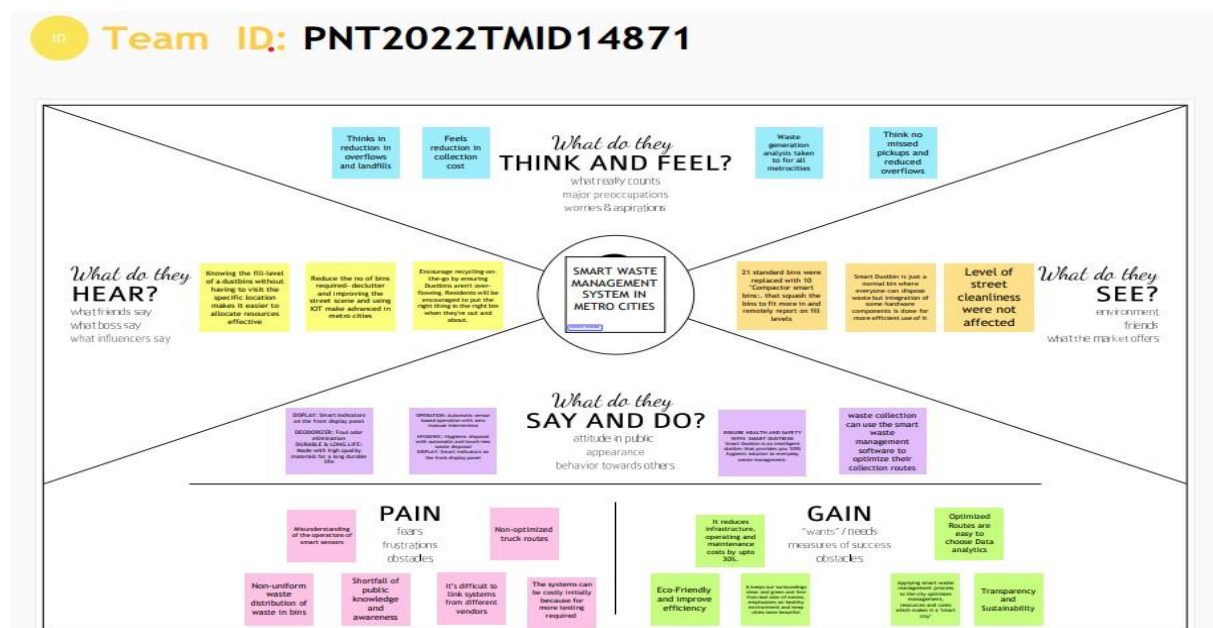
## **Problem Statement:**

Environmental hygiene is very important for a healthy life. In our daily lives, waste containers should be stored without proper supervision until they overflow and fill up to leak and produce environmental pollutants that cause serious problems for human and environmental health. Is often. In smart cities, garbage containers need to be monitored and managed to ensure a healthy and smooth environment. In the field of technological progress, real-time monitoring and manipulation of waste treatment is a difficult topic that arouses urgent interest in the research community. Traditional methods of monitoring waste in strategically located waste bins are time-consuming, labour-intensive, costly, highly tedious and inefficient methods that do not meet the needs of smart cities.

PAPER TITLE	AUTHOR	OUTCOME
IoT Based Smart Garbage System.	1) T.Sinha 2) R.M Sahuother	IoT Based Smart Garbage System which indicates directly that the dustbin is filled to a certain level by the garbage and cleaning or emptying them is a matter of immediate concern. This prevents lumping of garbage in the roadside dustbin which ends up giving foul smell and illness to people. The design of the smart dustbin includes a single by ultrasonic sensor which configured with Arduino Uno with this research ,it is sending SMS to the Municipal Council that particular dustbin is to overflow.
Raspberry pi-based smart waste management system using Internet of Things.	1)Shaik Vaseem Akram 2)Rajesh Singh	Nowadays it is becoming a difficult task to distinguish wet and dry waste. The new waste management system covers several levels of enormous workforce. Every time labourerS must visit the garbage bins in the city area to check whether they are filled or not. The data communicates to the cloud server for real-time monitoring of the system. With the real-time fill level information collected via the monitoring platform, the system reduces garbage overflow by informing about such instances before they arrive.

Smart Waste Management System.	1) Sanjiban Charkraborty	This Waste management is one of the serious challenges of the cities, the system now used in cities, we continue to use an old and outmoded paradigm that no longer serves the entail of municipalities, Still find over spilled waste containers giving off irritating smells causing serious health issues and atmosphere impairment.
Smart Solid Waste Management.	1) Mohd Helmy Abd Wahab.	At the time of trash diposal, the material to be recycled could be identified using RFID technology.
Analysis of Load cell.	1) Ranjeet Kumar 2) Sandeep Chhabra	Load Cells 4.1 General Load Cell related information A load cell is meant to measure the size of a mass but actually is a force sensor which transforms force into an electrical signal. The load cell needs the earth gravity to work. Every mass is attracted by the earth gravimetric field, that force is named “load”.

## Empathy Map:



# Brainstroming:

### Brainstorm & idea prioritization

Use this template to your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- Individuals complete
- Time to collaborate
- 2-4 people recommended

**Before you collaborate**

A 15-20 min preparation phase is key to get the most from a virtual session. You can't get going.

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1. Brainstorming

2. Define your problem statement

3. Prioritize

4. After you collaborate

**Brainstorm**

Write down any ideas that come to mind. No matter how silly or outrageous. The goal is to generate as many ideas as possible.

**Group ideas**

Share your ideas with others. Similar ideas can be grouped together. If a similar idea is already there, you can build on it. If it's new, you can add it.

**Prioritize**

Now that you have a list of ideas, it's time to prioritize. Use the matrix below to rank your ideas based on their importance and feasibility.

**After you collaborate**

Now that you have a list of ideas, it's time to prioritize. Use the matrix below to rank your ideas based on their importance and feasibility.

Quick action

Keep working forward

**SIVANI**

Chellamuthu

The proposed system will be able to monitor the waste level in the bins and generate alerts to the users. It will also be able to generate reports on the waste collection process.

Placing Ultrasonic sensor to detect level of bins

Enable GPS function to locate bins easier

Waste generation analysis to understand cities usages

**BHARATH KILMAR**

Load cell on bottom of bins

Place Arduino board at left side of bins

Visual fill status indicators on top of bins

using by GSM to bins achieve wireless communication with bins and managing center

**SIVANI**

**SUCHARRITHA**

when bins fill alert message to the authorized person

solar panels for power supply for IOT devices

Smart garbage maintenance server

Transparency and sustainable solution than normal garbage bins

Optimized trash collection route

Collect only degradable and non-degradable wastes

IOT alert authorized person when bins going to fill

Waste generation analysis to understand cities usages

Raspberry-pi with ultrasonic, GPS, Load cell, are configured

Importance

Feasibility

# Problem solution fit:

Project Title: Smart Waste Management for Metropolitan Cities

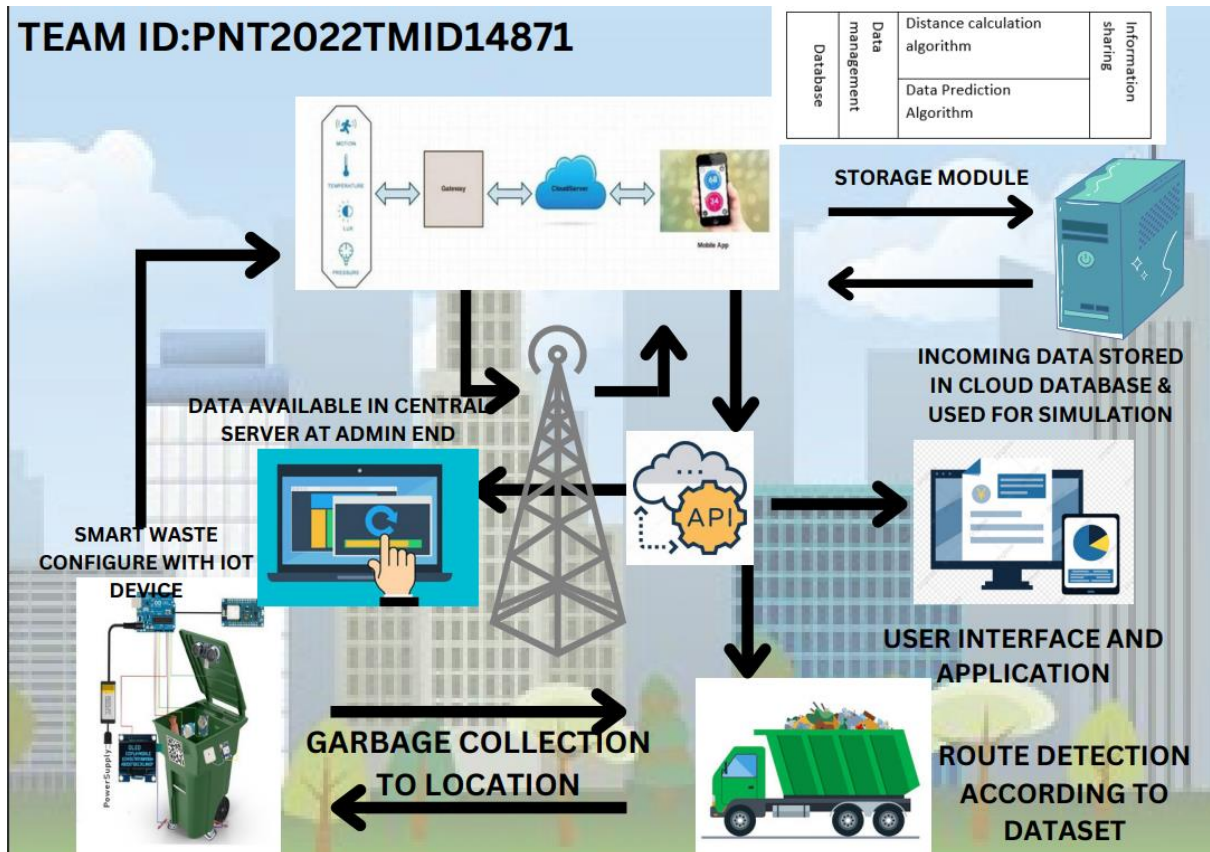
Project Design Phase-I - Solution Fit

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Define CS, fit into CC	<b>1. CUSTOMER SEGMENT(S)</b> <ul style="list-style-type: none"><li>Waste holders such as private individuals, property owners or organization owners.</li></ul>	<b>6. CUSTOMER CONSTRAINTS</b> <ul style="list-style-type: none"><li>This technology needs internet access to work properly</li><li>Customer need to buy IOT device to access it</li></ul>	<b>5. AVAILABLE SOLUTIONS</b> <ul style="list-style-type: none"><li>Use eco-friendly reusable bags.</li><li>Join buy and sell groups</li><li>Use of digital trash bins</li></ul>	Explore AS differentia
	<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <ul style="list-style-type: none"><li>Separate your wastes</li><li>Create a compostable site</li></ul>	<b>9. PROBLEM ROOT CAUSE</b> <ul style="list-style-type: none"><li>Lack of industry expertise</li><li>Emission of greenhouse gases</li><li>Poor recycling quality due to lack of education</li></ul>	<b>7. BEHAVIOUR</b> <ul style="list-style-type: none"><li>If the device is not working properly, please contact the customer care or drop a message</li></ul>	
Focus on AS? tap into BE, understand RC				Focus on AS? tap into BE, understand RC
Identify strong TR & EM	<b>3. TRIGGERS</b> <ul style="list-style-type: none"><li>Seeing how neighbors are having a clean environment after using it people will get admire by seeing others.</li></ul>	<b>10. YOUR SOLUTION</b> <ul style="list-style-type: none"><li>Our solution is to manage the waste efficiently by indicating the garbage level to the users as well as the authenticating persons to collect it.</li><li>The purpose is of making the clean environment.</li><li>REDUCE-REUSE-RECYCLE</li></ul>	<b>8. CHANNELS OF BEHAVIOUR</b> 8.1 ONLINE <ul style="list-style-type: none"><li>If it is in the online mode the bin is full it sends the notification to the authorized person</li></ul> 8.2 OFFLINE <ul style="list-style-type: none"><li>If it is in the offline mode everyday the garbage collecting truck will the garbage.</li></ul>	
	<b>4. EMOTIONS: BEFORE / AFTER</b> <ul style="list-style-type: none"><li>Before using this product, people will get suffered by health issues by the waste in the environment.</li><li>After using this product, they feel easy and have a healthy and a clean environment.</li></ul>			

# Solution Architecture:

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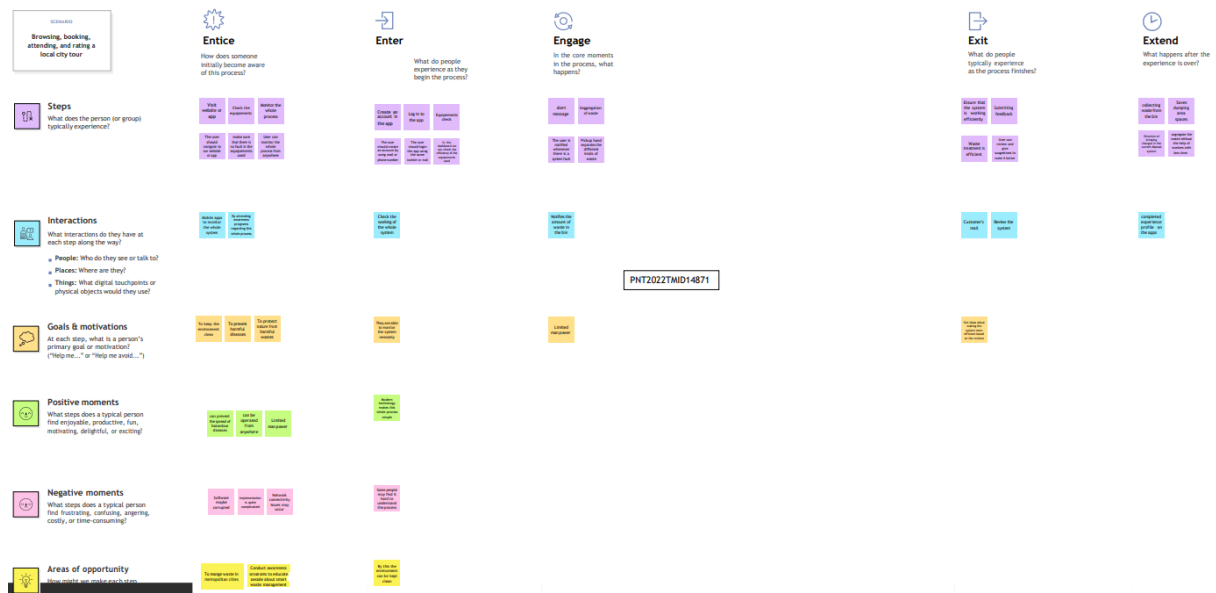
#### Proposed Solution Template:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	This project deals with the problem of waste management in smart cities, where the garbage collection system is not optimized. This project enables the organizations to meet their needs of smart garbage management systems. This system allows the authorised person to know the fill level of each garbage bin in a locality or city at all times, to give a cost-effective and time-saving route to the truck drivers.

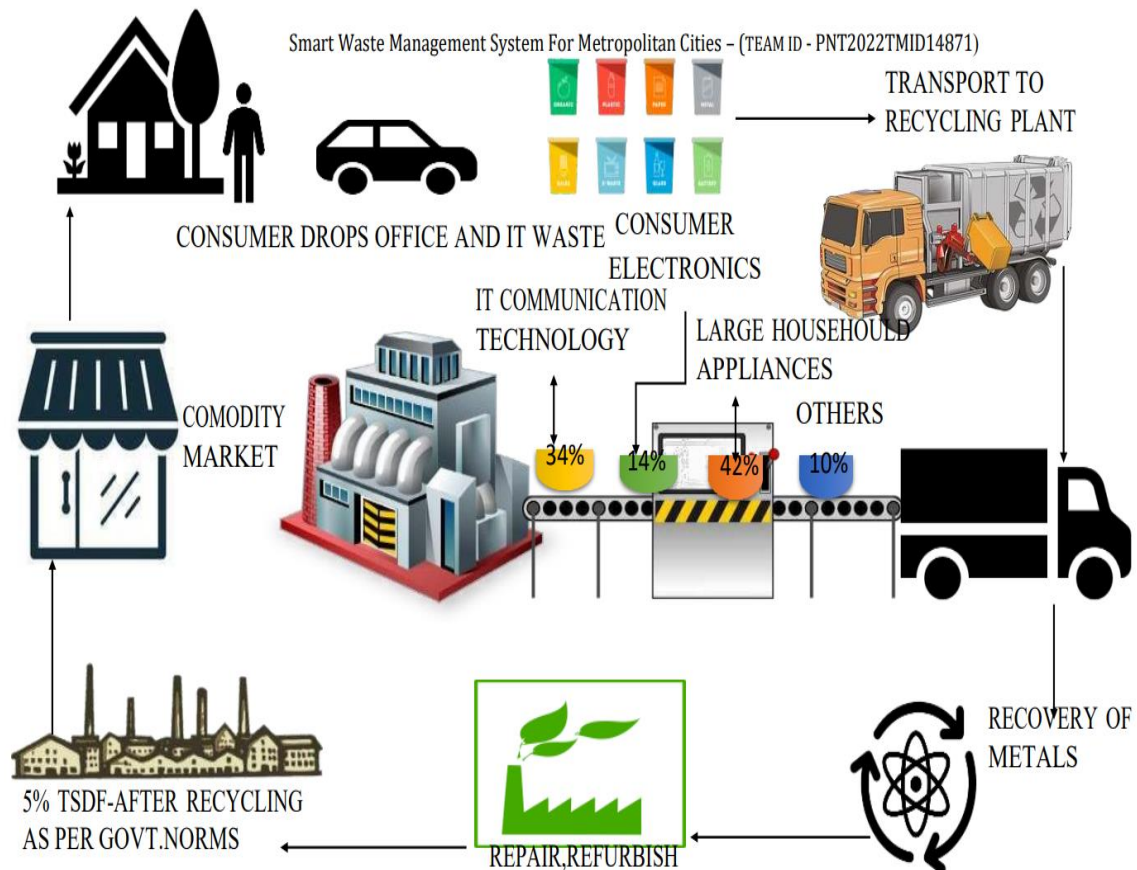
2.	Idea / Solution description	<p>The key research objectives are as follows:</p> <ul style="list-style-type: none"> <li>• The proposed system would be able to automate the solid waste monitoring process and management of the overall collection process using IOT (Internet of Things).</li> <li>• The Proposed system consists of main subsystems namely Smart Trash System (STS) and Smart Monitoring and Controlling Hut (SMCH).</li> <li>• In the proposed system, whenever the waste bin gets filled this is acknowledged by placing the circuit at the waste bin, which transmits it to the receiver at the desired place in the area or spot.</li> <li>• In the proposed system, the received signal indicates the waste bin status at the monitoring and controlling system.</li> </ul>
3.	Novelty / Uniqueness	<p>We are going to establish SWM in our college but the real hard thing is that janitor (cleaner) do not know to operate these thing practically so here our team planned to build a wrist band to them, that indicate via light blinking when the dustbin fill and this is Uniqueness we made here beside from project constrain.</p>
4.	Social Impact / Customer Satisfaction	<p>From the public perception as worst impacts of present solid waste disposal practices are seen direct social impacts such as neighbourhood of landfills to communities, breeding of pests and loss in property values</p>

5.	Business Model (Revenue Model)	Waste Management organises its operations into two reportable business segments: Solid Waste, comprising the Company's waste collection, transfer, recycling and resource recovery, and disposal services, which are operated and managed locally by the Company's various subsidiaries, which focus on distinct geographic areas; and Corporate and Other, comprising the Company's other activities, including its development and operation of landfill gas-to energy facilities in the INDIA, and its recycling brokerage services, as well as various corporate functions.
6.	Scalability of the Solution	In this regard, smart city design has been increasingly studied and discussed around the world to solve this problem. Following this approach, this paper presented an efficient IoT based and real-time waste management model for improving the living environment in cities, focused on a citizen perspective. The proposed system uses sensor and communication technologies where waste data is collected from the smart bin, in real-time, and then transmitted to an online platform where citizens can access and check the availability of the compartments scattered around a city.

## Coustumer journey:



## Data Flow Diagram:





## Technology Architecture:

### Smart Waste Management System For Metropolitan Cities

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