Smart Water Waste Management

Submitted
by

Team Id	PNT2022TMID01776
Team Lead	MITUN EASVAR S
Team Members	RATHEESH S MOHAMED IBRAHIM A KANNAN S

CONTENTS

1.Introduction

1.1 Project Overview

Smart cities represent an innovative concept for managing of urban environments and are emerging worldwide. Thereby, smart cities aim to achieve sustainability and to improve quality of life by including technical, institutional, economic, and social concepts in interaction with existing infrastructure, a key factor for the development of smart cities are efficient and reliable information and communication technologies (ICT) to monitor environmental parameters and to ensure interconnections between different areas and participants. Especially the Internet of Things (IoT) concept enables an easy large-scale implementation of measurement equipment due to the evolution of low-cost sensors in combination with innovative and wireless data transfer technologies

1.2 Purpose

The aim of this review is therefore to provide a comprehensive guideline as a first decision-making tool for researcher, network operators and stakeholders for the implementation of ICT in the field of UWI and to support development of future SCADA systems. The focus of this work is on applications related to urban drainage and water distribution networks, as ICT is relatively mature at centralized (treatment) facilities

2.Literature Survey

3. **LITERATURE SURVEY**

S.NO	PAPER TITLE	AUTHORS DESCRIPTION
1.	Automated garbage disposal system in Kota-Kinabalu	W.P.M.V. Wijesooriya A.K.D.M. Karunarathna U.K.A.U. Rathnapriya C.P. Chandrasekara K.A.K.N.D. Dharmapal This system has hard plastic dustbins, complete with covers, and can be kept in a backyard of a house, free from dogs. They will only be brought out to the gates on collection days, during which each bin is emptied in less than seven seconds, by a special disposal lift at the back of a garbage truck, without the dustman having to soil his hands.

2.	Cookeville 96-gallon wheeled cart :	Kittikhun Meethongjan, Suwit Kongsong. This is a technologically advanced system of refuse collection. It comprises a special truck, equipped with a mechanical/robotic arm, which automatically lifts and empties special trash containers, without the driver ever leaving the cab of the truck. This is a system designed to improve efficiency, make the task of putting out garbage easier and cleaner for the residents, improve the appearance of the town, and greatly reduce the injury potential for town employees. It is safer, more efficient, and requires less labor to collect solid waste. In addition, because the mechanical arm performs all the lifting, there is no risk of injury to the operator. This system also reduces labor, and allows to keep up with the growing demand without adding routes.

3.	Developmen t of Automatic Smart Waste Sorter Machine	Mahmudul Hasan At present solid waste management is a Russel1 , Mehdi major concern in the metropolitan cities Hasan of the developing and developed Chowdhury1, countries. As the population is growing, Md. Shekh Naim Uddin1 ,Ashif the garbage is also increasing. This Newaz1 , Md. huge unmanaged accumulation of Mehdi Masud garbage is polluting the environment, Talukder spoiling the beauty of the area and also leading to health hazards. 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 systems using IOT.

3. Problem Statement

PROJECT TITLE: SMART WASTE MANAGEMENT SYSTEM | Project Design Phase-1 -Solution Fit Template | Tea

1. CUSTOMER SEGMENT(S) CS

- Waste holders, such as private individuals, property owners or companies are our customers.

6. CUSTOMER CC

- As it is technology based it needs internet access to work properly.
- Customers need to buy some IOT Devices to access.
- They may use solar energy instead of electrical power.

5.AVAILA

Focus on J&P, tap into BE,

2. JOBS-TO-BE-DONE / PROBLEMS J&P

- Separate your waste.
- Create a composite site.
- Growing pressure in outdated waste managnent infrastructure, with declining level of capital investments and maintence.

9. PROBLEM ROOT CAUSE RC

- Lack of industry expertise.
- Emission of greenhouse gases.
- Poor recycling quality due to lack of education.

7. BEHAV

3. TRIGGERS TR

- Seeing how neighbors are having a clean environment after using it people will get admire my seeing others.

4.BEFORE /AFTER

- Before using this technology, society is suffered by health issues because the waste products produce air pollution.
- After using this technology, they feel at easy as it provides a clean society.

10. YOUR SOLUTION SL

- Our solutions is to manage the waste efficiently by indicating the garbage level to the users as well as authenticating persons to collect it and proceed to further process with the garbage.
- The purpose is of making clean Environment.

REDUCE- REUSE-RECYCLE

8.CHANN

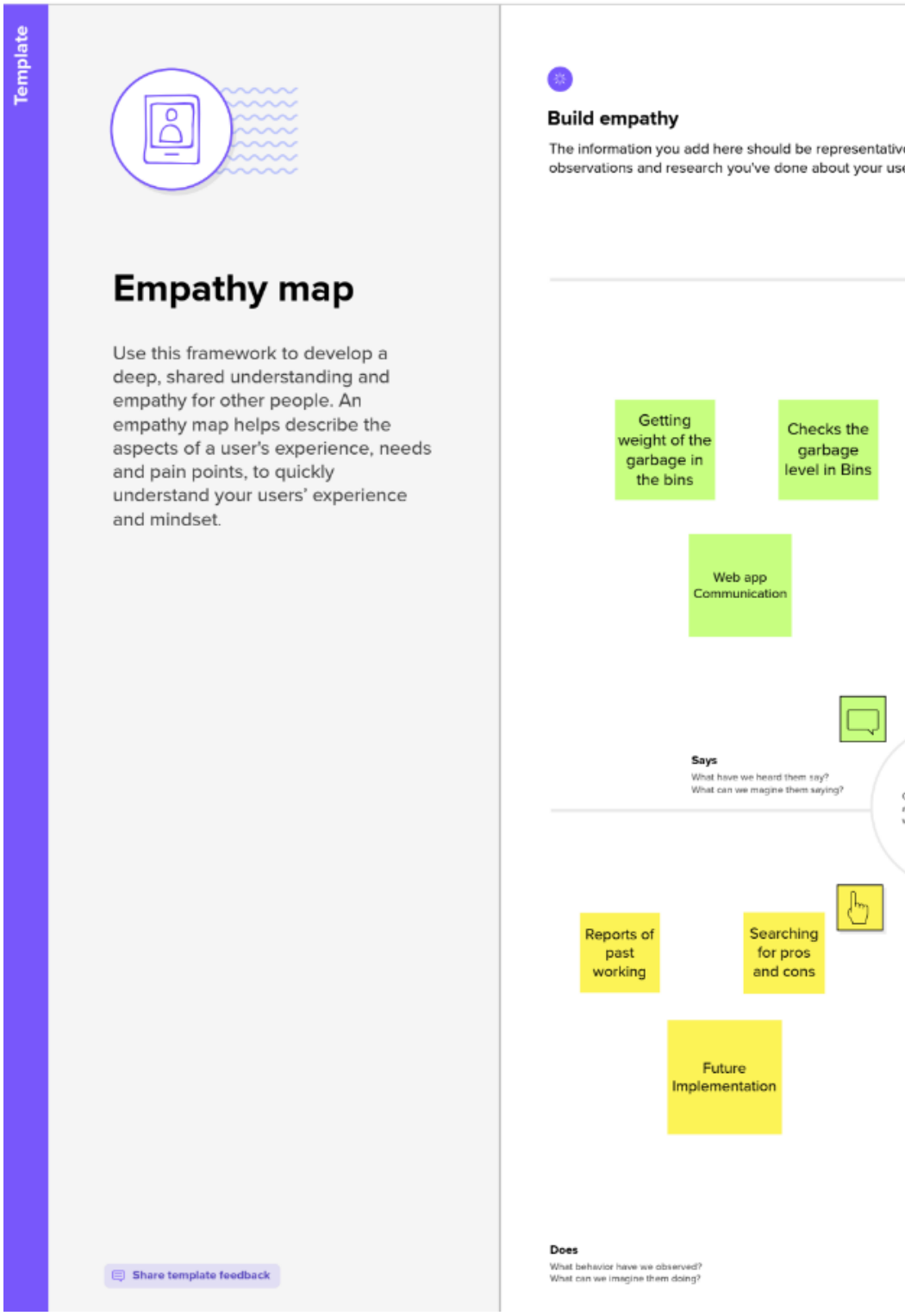
ONLIN

OFFLI

4. Ideation and Proposed

Solution

4.1 . Prepare Empathy Map



4.2 Proposed Solution

5 **Project Design Phase-I**

6 **Proposed Solution Template**

Date	29 September 2022

Team ID	PNT2022TMID01776 PNT2022TMID1438
Project Name	Project - Smart Waste Management System For Metropolitan Cities
Maximum Marks	2 Marks

7

8 **Proposed Solution Template:**

9 Project team shall fill the following information in the proposed solution template.

S.No.	Parameter Description

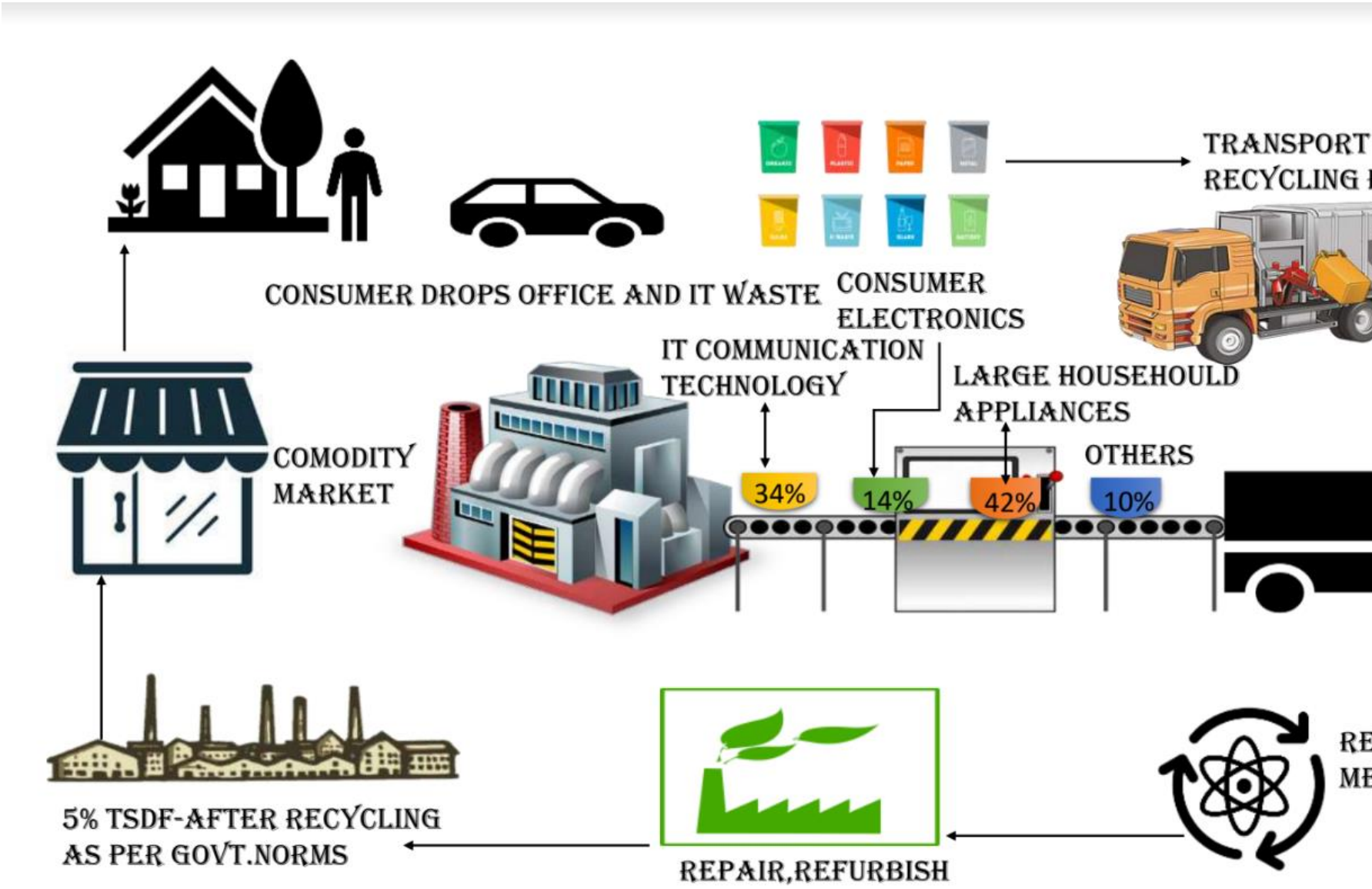
1.	Problem Statement (Problem to be solved)	The process in current city setting solves the waste problem partially while it creates other problems such as,Some trash bins are overfilled while others are underfilled by the trash collection time,overfilled trash bins create unhygienic conditions,unoptimized truck routes result in excessive fuel usage and environmental pollution and all collected trash is combined which complicates sorting at the recycling facility.Some of these problems can be mitigated by implementing smart waste management systems.
2.	Idea / Solution description	In this system, a 24×7 monitoring system is designed for monitoring dumpsters.Here a smart and organized system is designed for selective clearing.The ultrasonic sensor is used for measuring the level of waste in the dumpster.DC motor powered platform is used for segregating wet and dry waste. IR sensor and moisture sensor is used for separating wet and dry waste.If either of the containers is full then an alert message is sent from the dumpster.In turn, employees can clear the corresponding dumpster.All these sensors are connected to an Arduino Uno board.It can be used for controlling all mechanical setup based on current conditions

10

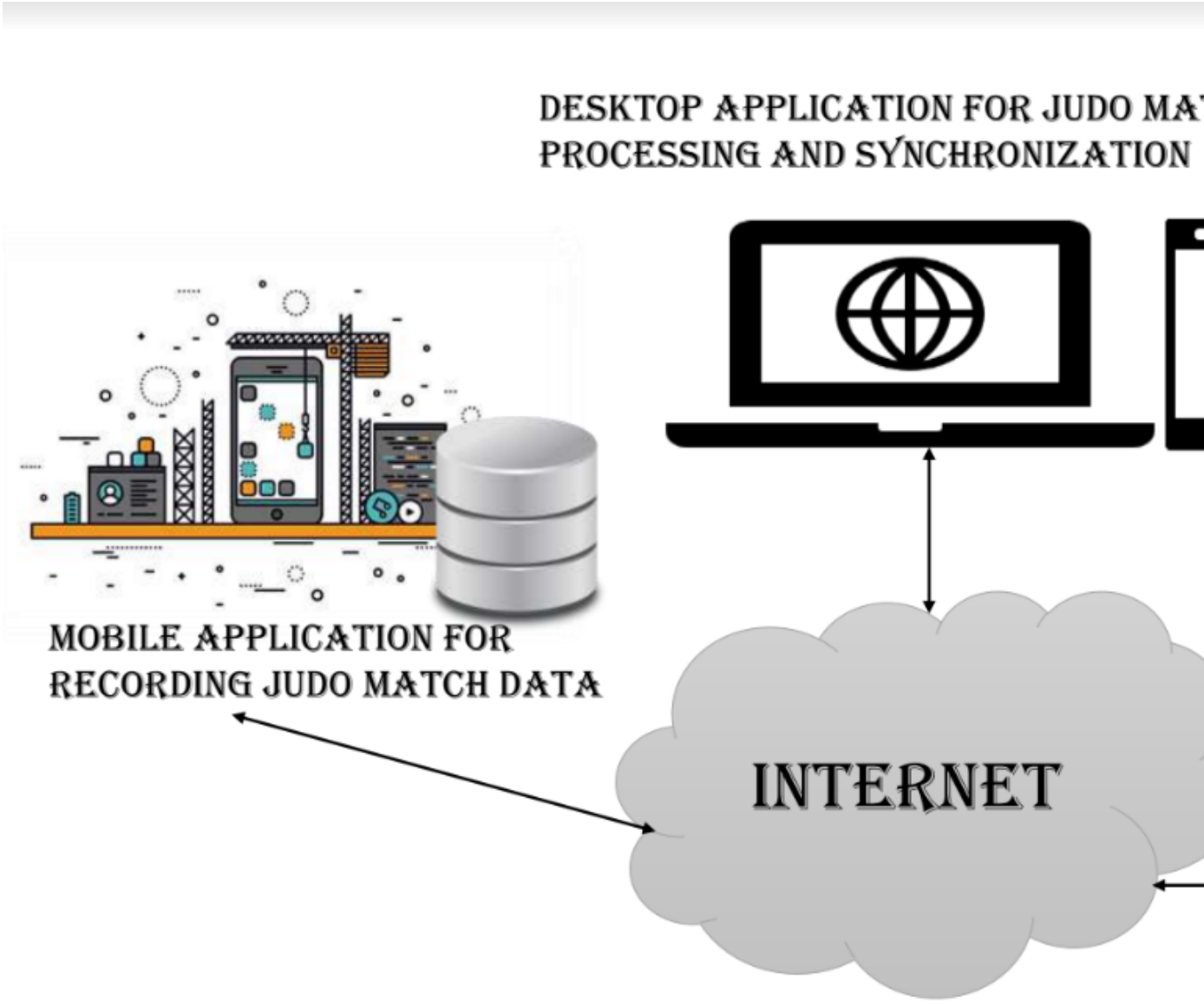
3.	streams ● Create waste management- focused community outreach plane

4.	bourhood of landfills to communities,breeding of pests and loss	in property values ● The IOT solution use the data and select optimum routes for waste collection trucks
5.	es revenue through the provision of various waste management	and disposal services. ● Recycling solutions to residential,commercial,industrial and municipal clients
6.	s for collecting recyclables like paper ,glass and plastic.	● Recycling not only saves energy but also prevent the material from going to landfills & incineration and provide raw material for new products

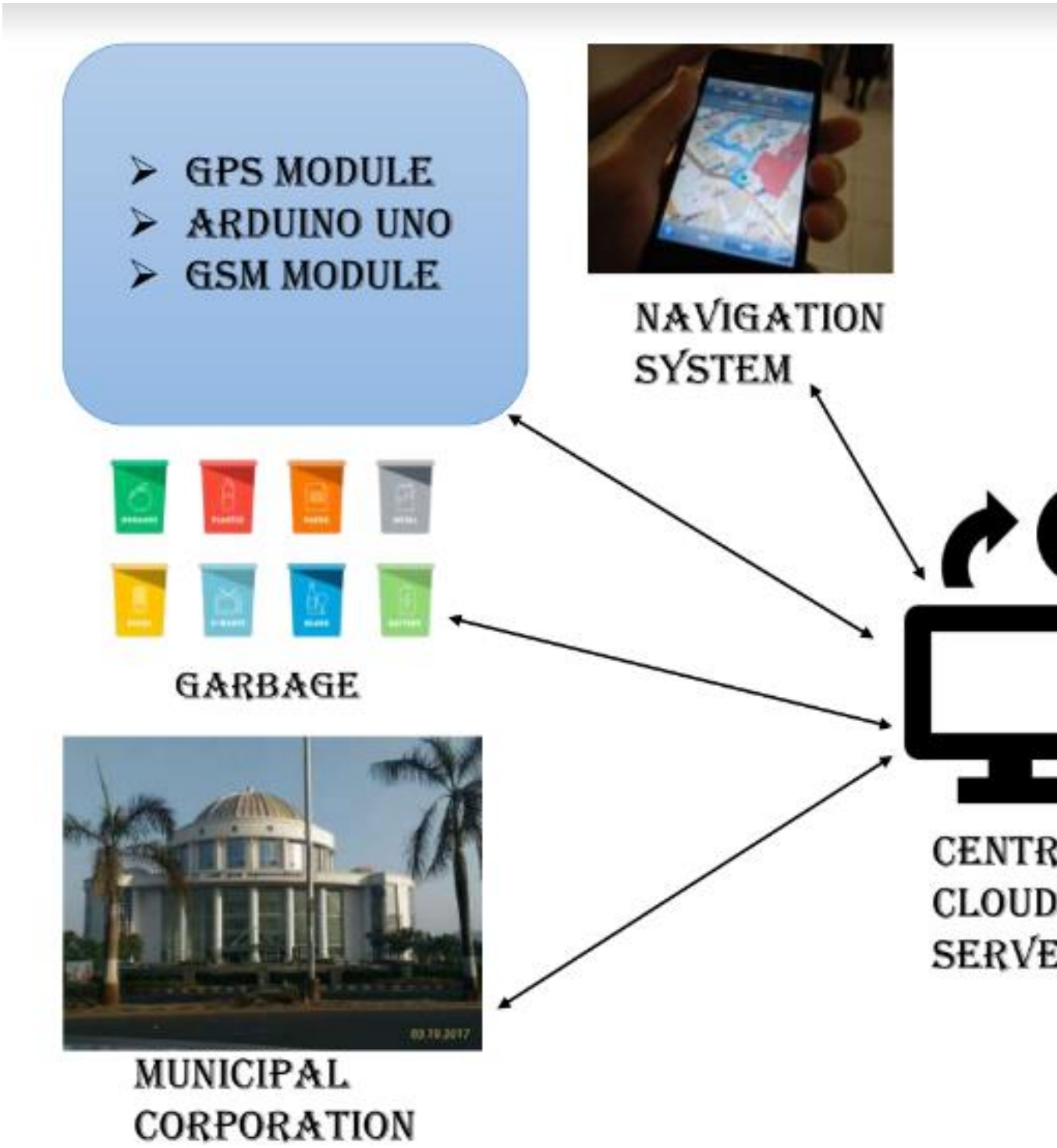
5. Flow Diagram



6.Technology Architecture



7. Solution Architecture



8. Functional and Non-functional

Statement

9. **Project Design Phase-II**
10. **Solution Requirements (Functional & Non-functional)**

Date	06 October 2022
Team ID	PNT2022TMID48488
Project Name	SMART WASTE MANAGEMENT SYSTEM
Maximum Marks	4 Marks

11.

12. **Functional Requirements:**

13. Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Detailed bin inventory.	All monitored bins and stands can be seen on the map, and you can visit them at any time via the Street View feature from Google. Bins or stands are visible on the map as green, orange or red circles. You can see bin details in the Dashboard – capacity, waste type, last measurement, GPS location and collection schedule or pick recognition.
FR-2	Real time bin monitoring.	The Dashboard displays real-time data on fill-levels of bins monitored by smart sensors. In addition to the % of fill-level, based on the historical data, the tool predicts when the bin will become full, one of the functionalities that are not included even in the best waste management software.. Sensors recognize picks as well; so you can check when the bin was last collected. With real-time data and predictions, you can eliminate the overflowing bins and stop collecting half-empty ones.
FR-3	Expensive bins.	We help you identify bins that drive up your collection costs. The tool calculates a rating for each bin in terms of collection costs. The tool considers the average distance depo-bin discharge in the area. The tool assigns bin a rating (1-10) and calculates distance from depo-bin discharge.

FR-4	Adjust bin distribution.	Ensure the most optimal distribution of bins. Identify areas with either dense or sparse bin distribution. Make sure all trash types are represented within a stand. Based on the historical data, you can adjust bin capacity or location where necessary.
FR-5	Eliminate unefficient picks.	Eliminate the collection of half-empty bins. The sensors recognize picks. By using real-time data on fill-levels and pick recognition, we can show you how full the bins you collect are.

14.

		The report shows how full the bin was when picked. You immediately see any inefficient picks below 80% full.
FR-6	Plan waste collection routes.	The tool semi-automates waste collection route planning. Based on current bin fill-levels and predictions of reaching full capacity, you are ready to respond and schedule waste collection. You can compare planned vs. executed routes to identify any inconsistencies.

15.

16. **Non-functional Requirements:**

17. Following are the non-functional requirements of the proposed solution.

FR No.	**Non-Functional Requirement**	**Description**
NFR-1	**Usability**	IoT device verifies that usability is a special and important perspective to analyze user requirements, which can further improve the design quality. In the design process with user experience as the core, the analysis of users' product usability can indeed help designers better understand users' potential needs in waste management, behavior and experience.
NFR-2	**Security**	Use a reusable bottles Use reusable grocery bags Purchase wisely and recycle Avoid single use food and drink containers.

NFR-3	**Reliability**	Smart waste management is also about creating better working conditions for waste collectors and drivers. Instead of driving the same collection routes and servicing empty bins, waste collectors will spend their time more efficiently, taking care of bins that need servicing.
NFR-4	**Performance**	The Smart Sensors use ultrasound technology to measure the fill levels (along with other data) in bins several times a day. Using a variety of IoT networks ((NB-IoT,GPRS), the sensors send the data to Sensoneo's Smart Waste Management Software System, a powerful cloud-based platform, for data driven daily operations, available also as a waste management app. Customers are hence provided data-driven decision making, and optimization of waste collection routes, frequencies, and vehicle loads resulting in route reduction by at least 30%.
NFR-5	**Availability**	By developing & deploying resilient hardware and beautiful software we empower cities, businesses, and countries to manage waste smarter.
NFR-6	**Scalability**	Using smart waste bins reduce the number of bins inside town , cities coz we able to monitor the

18.

		garbage 24/7 more cost effect and scalability when we moves to smarter.

9. Results

In a nutshell, we can say that the demand and advantage of IoT will keep on expanding in every domain. We can not only conserve and preserve our valuable resources, but we can also meet the demands and expectations of people adequately through IoT sensors. Most of the enterprises have already adopted IoT-

based services after getting aware and acquainted with the water management issues.

10. Conclusion

The importance of system-wide management of urban water infrastructure (UWI) in interaction with urban population and other infrastructure areas will increase in the future. As control opportunities are relatively mature in centralised facilities (e.g., drinking water and wastewater treatment plants), our focus is on networks, including system elements distributed over the area in question. In this context, this review summarises a wide range of applications in the field of UWI networks for a comprehensive analysis of the spatial and temporal resolutions of measurement data, which are needed for a wide range of applications and not limited to a single application. For example, inflow measurements of drinking water at the district scale are utilised for real-time operations, such as service pressure or leakage detection; however, this information is also required for case-specific network designs. In contrast, each communication technology has different characteristics and limitations, constraining its use to specific applications. Moreover, an integrated approach towards smart water cities requires the combination of different communication technologies to satisfy all specifications.