

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

Date	08 November 2022
Team ID	PNT2022TMID20979
Project Name	SMART WASTE MANAGEMENT SYSTEM FOR METROPOLITAN CITIES
Maximum Marks	4 Marks

**Functional Requirements:**

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story/Sub-Task)
FR-1	Detailed bin inventory.	The map shows all monitored bins and stands, and Street View from Google can be used to visit them at any time. Bins are shown as green, orange or red circles. The Dashboard shows bin details, such as waste type and last measurement. 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.	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.	Based on the historical data, you can adjust bin capacity or location where necessary. Identify areas with either dense or sparse bin distribution
FR-5	Eliminate inefficient 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.

		The report shows how full the bin was when picked. You immediately see any inefficient picks below 80% full.
FR-6	Planwastecollectionroutes.	.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

### Non-functional Requirements:

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

FRNo.	Non-Functional Requirement	Description
NFR-1	<b>Usability</b>	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	<b>Security</b>	Use reusable bottles Use reusable grocery bags Purchase wisely and recycle Avoid single-use food and drink containers.
NFR-3	<b>Reliability</b>	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	<b>Performance</b>	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 Sansone'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	<b>Availability</b>	By developing & deploying resilient hardware and Beautiful software we empower cities, businesses, and countries to manage waste matter.
NFR-6	<b>Scalability</b>	Using smart waste bins reduce the number of bins in the town, cities so we are able to monitor the

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