Project Design Phase-II

Solution Requirements (Functional & Non-functional)

Date	03 October 2022
Team ID	PNT2022TMID25311
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 invertory	• All monitored bins and stands are visible on the map, and you may visit them at any time using Google's Street View tool. • Bins or stands appear on the map as green, orange, or red circles. • The Dashboard displays bin information such as capacity, trash type, last measurement, GPS location, collection schedule, and pick recognition.
FR-2	Real time bin monitoring	• The Dashboard shows real-time data on bin fill levels monitored by smart sensors. • The programme also forecasts when the bin will become full based on previous data, which is one of the capabilities that even the best waste management software does not offer. This is in addition to the percentage of fill-level. • With real-time data and projections, you can prevent overflowing bins and quit collecting half-empty ones. Sensors also recognise picks, allowing you to determine when the bin was most recently collected. • Garbage must be collected within a certain time frame because half of the bins have not been collected in several days and are emitting harmful gases.

FR-3	Expensive bins	• We assist you in locating bins that increase your collection prices. In terms of collection expenses, the tool assigns a rating to each bin. • The programme takes into account the average distance depo-bin discharge in the area. • The tool assigns a grade (1-10) to each bin and calculates the distance between them.
FR-4	Plan waste collection routes	• Route planning for garbage pickup is semi-automated using the tool. You are prepared to act and arrange for garbage collection based on the levels of bin fill that are now present and forecasts of approaching capacity. • To find inconsistencies, compare planned vs. accomplished paths.

Non-functional Requirements:

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

FR No.	**Non-Functional Requirement**	**Description**
NFR-1	**Usability**	• Usability is a unique and significant perspective to examine user requirements, which can further enhance the design quality, according to IoT devices. • In the design process that prioritises user experience, analysing consumers' product usability can help designers better understand users' prospective demands in waste management, behaviour, and experience.
NFR-2	**Security**	• Avoid using single-use food and drink containers by using reusable bottles and grocery bags, recycling, and making intelligent purchases.
NFR-3	**Reliability**	• Creating better working conditions for waste collectors and drivers is another aspect of smart waste management. • Waste collectors will use their time more effectively by attending to bins that require service rather than travelling the same collection routes and servicing empty bins.

NFR-4	**Performance**	• The Smart Sensors assess the fill levels in bins (along with other data) numerous times per day using ultrasound technology. • The sensors feed data to the Smart Waste Management Software System, a robust cloud-based platform for data-driven daily operations that is also available as a waste management app, using a variety of IoT networks (NB-IoT, GPRS). • As a result, customers receive data-driven decision making, route, frequency, and truck load optimization services that reduce garbage collection costs by at least 30%.
NFR-5	**Availability**	By creating and implementing robust hardware and gorgeous software, we enable cities, companies, and nations to manage garbage more intelligently.
NFR-6	**Scalability**	Using smart waste bins allows us to scale up and monitor the garbage more efficiently while also reducing the number of bins needed in towns and cities.