# Project Design Phase-II

**Solution Requirements (Functional & Non-functional)**

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| Date | 10 October 2022 |
| Team ID | PNT2022TMID43251 |
| Project Name | Smart Waste Management System For Metropolitan Cities |
| Maximum Marks | 4 Marks |

# Functional Requirements:

Following are the functional requirements of the proposed solution.

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| **FR**  **No.** | **Functional Requirement (Epic)** | **Sub Requirement (Story / Sub-Task)** |
| FR-1 | **Fitting IoT device in the trashcans** | * The IoT device need to be fixed in the dustbin with Water proof safety. * The IoT deviceconsists Ultrasonic sensor, IR sensor, Weightsensor. * To send data to the cloud GPRS/GSM is used. |
| FR-2 | **Detailed bin inventory** | * All monitored bins and stands can be seenon the map, and you can visit them at anytime 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-3 | **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. |

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|  |  | * 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-4 | **Expensive bins** | * We help you identify bins that drive up your collection costs. * The tool calculates arating 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-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 fullthe bins you collect are. |
| FR-6 | **Predictions for bin fullness** | * It is a 24×7 monitoring system is designed for monitoring the dumpster. * If either of thecontainers is full then an alert message is sent from the dustbin to employees and the cloud. In turn, employees can clear the corresponding dumpster. * The bin has Sensors that can 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-7 | **Plan waste collection routes** | * 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 toidentify any inconsistencies. |

# Non-functional Requirements:

Following are the non-functional requirements of proposed solution

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| **FR**  **No.** | **Non-Functional**  **Requirement** | **Description** |
| NFR-1 | **Usability** | * A smart solution has been proposed to make the waste by sorting more simple and accurate and improve the user experience, usability, and satisfaction. * It aims to optimize ease of use while offering maximum functionality. |
| NFR-2 | **Security** | * Building and deploying IoT-based smart waste management in cities can be a complex, time consuming and resource-intensive process. * Many municipal IT departments will not have the resources or in- house skills to support such a project internally. |
| NFR-3 | **Reliability** | * Smart waste management is also about creating better working conditions for waste collectors and drivers. * Operates in a defined environment without failure resulting in less manpower, emissions, fuel use and traffic congestion. |
| NFR-4 | **Performance** | * The system will provide accurate reports, thus increasing the efficiency ofthe system. * The real-time monitoring ofthe garbage level with the help of sensors and wireless communication will reduce the total number of trips required of Garbage collecting truck. * This will reduce the total expenditure associated with the garbage collection. |
| NFR-5 | **Availability** | * Another purpose of this project is to make the proposed waste management system ascheap as possible. * By this we empowercities, businesses, and countries to manage waste smarter. |

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| NFR-6 | **Scalability** | * Using smart waste bins reduce the number of bins inside town , cities coz we able to monitor the garbage 24/7 more cost effect and scalability when we moves to smarter. |

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